RAILROAD GAZETTE

FRIDAY, JUNE 21.

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Contributions.

Truck Radius, Canadian Pacific Mogul.

CANADIAN PACIFIC RAILWAY COMPANY,
MONTREAL, June 13, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the query signed "D," published in your issue of the 7th, with regard to the radius of the truck on our Mogul engine, I may inform the writer that these trucks were originally designed with a radius of 5 ft. 2 in., and I built an engine of that design; but experience, that greatest of all teachers, proved that for our requirements a shorter radius was desirable. I consequently altered it to 4 ft., and have every reason to believe from the results that the alteration has worked the desired end, and that the engines thus altered are giving satisfaction on all divisions of our road.

FRANCIS R. F. BROWN,
Mechanical Superintendent.

Can an Iron Foundry be Run on a Chemical Basis?

TO THE EDITOR OF THE RAILROAD GAZETTE:

I desire very much to get opinions on the question of the possibility of running a cast-iron foundry on a chemical basis; *i. e.*, is it possible to form a satisfactory mixture and duplicate existing irons when one is furnished with an exact analysis of the iron to be duplicated and of the irons in stock? This is a question of much importance to me, and I hope that I will learn from your columns the results of existing systems of foundry operation where the chemical analyses of the stock in store and the output are relied upon to guide the selection of irons for the various mixtures. X. X.

[Our correspondent has tackled a much disputed question. The enthusiastic chemist claims to be able to duplicate almost any alloy or mixture of metals from analysis, and, on the other hand, the every-day successful foundryman claims that he can see little or no connection between the chemical analysis and the character of the castings; but the appearance of the fractures of the components gives the best clew to the character of the product.—EDITOR RAILROAD GAZETTE.]

Clearance Diagram for Rolling Stock.

Oregon Pacific Railroad,
CORVALLIS, Or., May 15, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

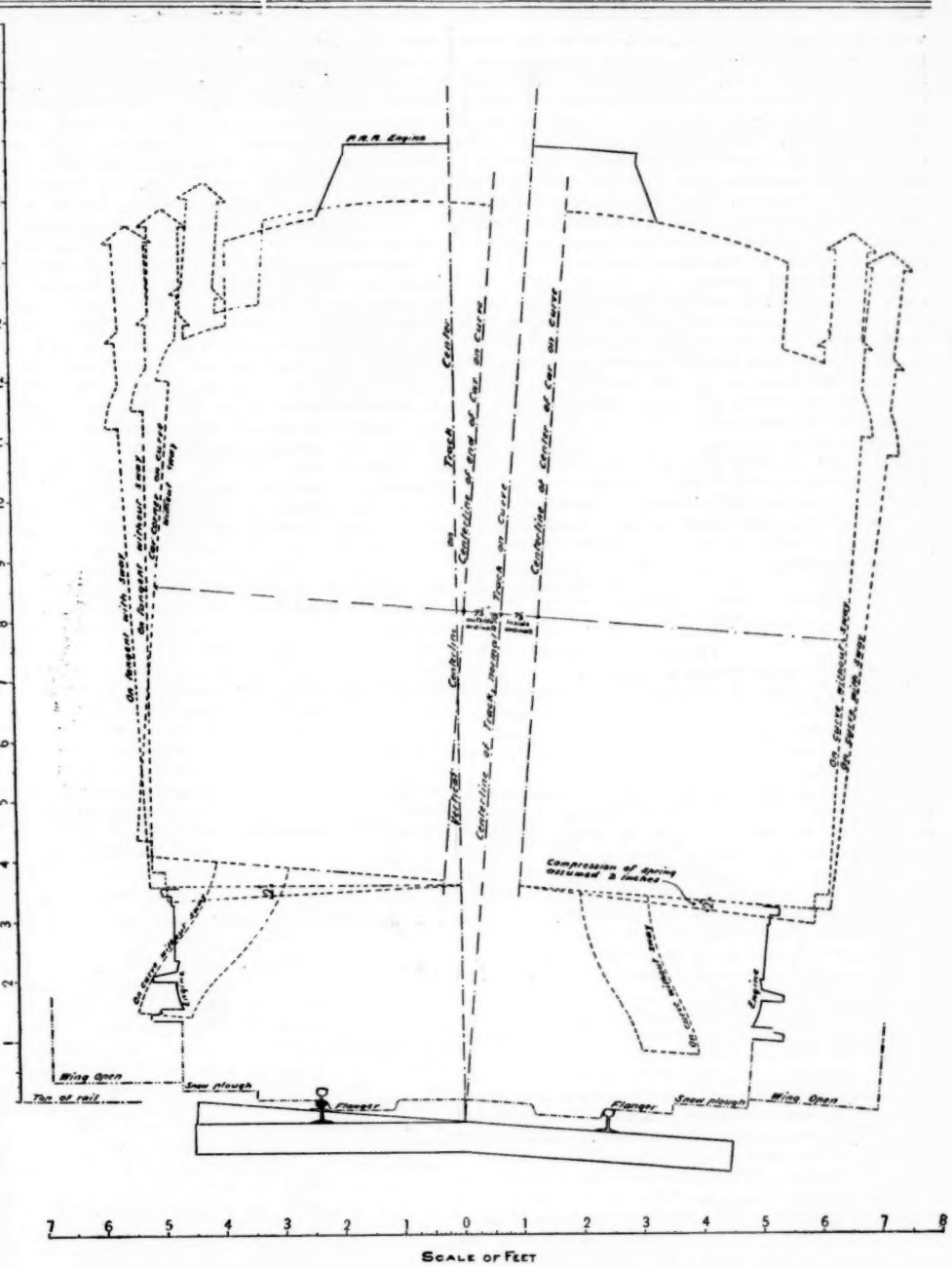
I send you a clearance diagram intended to include not merely the outlines of rolling stock, but the varying positions of these outlines. I do not remember seeing any clearance diagram that included more than rolling stock outlines, or that gave car lengths and pivotal lengths, which are essential in determinations of clearance. It seems to be assumed generally that with rolling stock outlines given, the field engineer can readily determine in the field the maximum outlines for all curvatures and positions. The draughtsman who has endeavored to locate these outlines, with reference to centre of track, under all possible conditions, will readily appreciate difficulties met and time required. The diagram is submitted in the hope of bringing out some discussion of what is an important and troublesome problem for both engineer and operating departments.

The diagram given herewith involved examination of the following points:

1, rolling stock outlines; 2, rolling stock lengths; 3, curve internal ordinates; 4, curve external ordinates; 5, tilt from lateral elevation of track; 6, sway of car body on the springs.

The rolling stock outlines were obtained by sending a preliminary diagram of outlines of cars, engines, etc., to the leading makers of cars and engines, including the following:

Allison Manufacturing Co., Barney & Smith Co., Erie Car Works, Harlan & Hollingsworth Co., Harrisburg Car Manufacturing Co., Jackson & Sharpe Co., Middleton Car Works, Pullman Palace Car Co., Youngston Car Co. and others, Baldwin Locomotive Works, Pittsburgh Locomotive Works, Schenectady Locomotive Works, Taunton Locomotive Works and others.



CLEARANCE DIAGRAM FOR ROLLING STOCK.

NOTE.—Length of body, 70 ft.; roof, 76 feet; coupled length, 77 ft.; centre to centre of trucks, 54 ft.
Maximum curvature, 10°; lateral inclination on curves, 5 in. at rail centres; grade level maintained on curve at centre of track; gauge, 4 ft. 8½ in.

These diagrams were returned from the makers with their maximum dimensions written in. Outlines were also obtained from the White Flanger, the Rotary Snow Shovel and other special rolling stock; and from Mr. L. B. Paxson, Superintendent Motive Power and Rolling Stock, Philadelphia & Reading.

The principal existing clearance diagrams consulted were the Pennsylvania diagram furnished me by Mr. Theo. N. Ely, General Superintendent of Motive Power, Pennsylvania Railroad Company; and the West Shore diagram as used by me when acting as Chief Assistant to Col. Katte in extending the West Shore road southward through Jersey City. These diagrams, especially that of the Pennsylvania, are very full in detail; but were not combined with track changes so as to show the actual maximum outline, for all positions of rolling stock. Although I have seen no diagram that gave pivotal and car length, to determine car outline locations on curve, doubtless there are such in use. The writer recalls an instance where the maximum car outline, fastened to a hand car, was taken along a line of road, to ascertain whether certain large cars would pass; and because this outline cleared all points everything was considered satisfactory.

No ordinate was assumed for cab outlines, or cylinder or stack outlines of locomotives, as these parts of the locomotive are near pivotal points and have but little ordinate. The same is also true of snow-plough wings when open and of flangers. The centre of cars, with the present long pivotal bases, have a large internal ordinate, which is usually noted in arranging clearance widths. The external projection of car corners and roof corners is not usually noted. Where not cancelled by tilt, this ordinate is about equal to the internal ordinate and might be of importance in transferring cars on a newly laid track where the tilt had not yet been given to the track. The Harlan & Hollingsworth Co. place their jacks close to the side (or 4 ft. 10 in. from centre of car to centre of jack) instead of near the ventilator, increasing the clearance outline very largely thereby.

The item most difficult to determine was the allowance for sway. Although an inequality in track might be taken up by the springs without affecting the location of car body, and might cause no sway, yet the effects of centrifugal force and its reaction on curves, together with inequalities, will result in an amount of sway affecting the location of eaves and jacks considerably. Two inches above and below a normal line has been adopted, pivoting on the centre of truck. This is based on the data given by the spring companies, as well as on observation

I have no doubt some of your readers can give useful hints as to proper allowance for sway, as well as special and valuable information about unusually large dimensions of rolling stock that would enlarge somewhat the clearance diagram shown. ARCHIBALD A. SCHENCK.

Disposition of Incomplete Train Orders when the Wire Fails.

ATLANTA, Ga., May 27, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Rule 509 of the standard code provides that "after the order has been repeated correctly . . . the response 'O K' . . . will be sent," etc. It is to be inferred that the "O K" is given *immediately* after the order has been repeated. Rule 510 provides that after "O K" has been given and before "complete" has been given, "the order must be treated as a holding order for the train addressed, but must not be otherwise acted on until 'complete' has been given." It further adds that should the line fail before the "O K" has been received and acknowledged the order at that office "is of no effect, and must be [there] treated as if it had not been sent."

I would like to ask you to enlighten me with reference to the exact meaning of these two rules. I understand that *without* the "O K" the order is to be treated as if it had not been sent; in other words it is no order. *With* the "O K" it is to be *treated* as a holding order for the train addressed; which means that it *is* a holding order for such train. My assumption would be that unless the line fails immediately after the order has been repeated, the "O K"

will be given and acknowledged, and it then becomes a holding order, which undoubtedly means that the train addressed is to be held by that order. Now the question arises, where is the train to be held; at the point at which the order is placed? If so, how long? Indefinitely, or until the line is restored, of course. This would be inconsistent with the fundamental rules for the movement of trains, viz., that they have the right to move by time table until their rights are restricted by train orders. The opposing inferior train could not be moved farther than the point to which the order gives it right to go, and we find two trains lying some distance apart, while neither has the right to move on.

Let us try another construction; that the "hold" takes effect at the point at which the order takes effect. How long does the train remain there (supposing there is no communication with the dispatcher's office)? There certainly can be no earthly use in holding our train after the order has been executed—no use to hold the train indefinitely. Shall we then say that the rule means that our train can proceed after the order has been executed? Then it is *not* a holding order, but is as good, in its working, as any order with a dozen "completes" on it, and in this case why should the words "but must not be *otherwise* acted on until 'complete' has been given" be introduced? If this construction is the right one the rules should so state. In any event the rules should be explicit enough to state which is correct. If I cannot understand the rules what am I to expect of my trainmen?

MASTER OF TRAINS.

Palmer's Audible Signal.

PHILADELPHIA, June 11, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I desire to answer the communication of Mr. Blodgett printed in the *Railroad Gazette* of June 7. That gentleman claims to have discovered various defects in my signal. I have no objections to a fair discussion of its merits. The system will stand the test and I invite it.

His description of the circuits is correct, but the principle of construction of this system forbids the occurrence of the evils he suggests. Regarding the sufficiency of time for the attraction of an armature to its magnet during the interval between the contact of the brushes with the auxiliary rails and the closing of the circuit at X and Y, it is clear that the length of time required for the attraction of an armature to its magnet depends on the size and shape of the armature, the extent of its movement and the amount of current. The post U at X Y must move a distance of say 4 in., while the armature of magnet o moves but ⅛ in. Notwithstanding a slight inertia of the armature and magnet it is clear that the armature will have done its work, made its movement, and broken the circuit X Y before the movement of post U has been completed.

Mr. Blodgett further says: * * "Should the relay o fail to operate, there might be *three* circuits closed at the same time." If the whistle, which is preferable, is used instead of the bell, it would not be possible to have more than one circuit in operation. With the whistle in use a wire leads from the battery to a magnet. This when in action keeps a whistle valve closed. The wire leads thence to a contact spring at X Y, thence to a metallic strip at X Y, thence to a second contact spring at X Y, and thence to the battery. Thus when the brushes are in a vertical position the circuit on the locomotive is closed, and no signal sounds. Now, when the brushes come in contact with the auxiliary rails, should the external circuit leading therefrom be closed, then the locomotive circuit forms part of the external circuit, and no signal sounds. But should the external circuit be open the locomotive circuit would also be opened and the whistle would sound the alarm, as there would then be no force to keep the valve closed. But with the bell, but two circuits will be in operation at once. With a sufficiency of current the magnet o cannot fail to attract its armature.

As for changes of adjustment, the battery would invariably have a far greater range of power than a mere sufficiency to operate the one or two circuits at once, and this would avoid any necessity for change of adjustment. Under no circumstances could there be three circuits in operation at the same time, unless there was something radically out of order, in which event those concerned would have instantaneous notice of the fact by the sounding of the signal. I do not suggest, or expect, that the customary inspection necessary in all systems is to be dispensed with. As for snow or ice rendering the system inoperative, an actual test would disprove Mr. Blodgett's charge. His objections are largely theoretical, and this among them. Precautions have been taken, and the proper appliances, which are a part of this system, would operate to prevent such a contingency. The diagram printed merely shows the principle of the invention, without giving specific details.

In objecting to the principle of my signal Mr. Blodgett substantially admits that the signal is "*there*" when needed. He might have gone further and stated the converse, that it is "*not there*" when not needed. With the whistle in use the system does not work on an open circuit, but on a positive closed circuit. With the gong or bell it is not strictly an open circuit, for the reason that when the brushes arrive at a signalling point one circuit or the other is closed. If there is safety ahead the brush circuit is closed, and if danger ahead the bell circuit is closed. The current, which is a positive force, keeps the whistle valve in place. If that current or positive force is interrupted or broken at signal points, the whistle valve falls away or opens by reason of the absence of force to keep it in place, and the signal sounds.

Mr. Blodgett's so-called "foundation principle" is about as applicable to an audible signal as is the general tenor of his reasoning in connection with the Palmer system. Do you really mean, Mr. Blodgett, that an audible automatic signal should be constantly sounding? the whistle eternally and infernally blowing? the bell everlastingly ringing? I am inclined to doubt it, for I take it that you are sufficiently intelligent to avoid making any road you might be connected with liable to an indictment for maintaining a nuisance by putting in operation your "foundation principle" in connection with an automatic audible signal. The Palmer system accurately insures an all clear section, that the switches for the main line are all set, that the crossings, bridges, culverts, etc., are all in shape for safe travel, and that the apparatus which indicates all this is in its normal condition and actually at work. This is all accomplished and no noise made about it, and the force which accomplishes this is in existence, going on all the time, without sounding any harsh alarms until there is danger ahead. Now pursuing the line of your own argument, if there is any weakening or cessation of this force, it does just exactly what you claim an automatic system should do, it produces a signal, and this signal continues to be displayed, or better, as in this case, sounded, and this sound continues until the engineer stops it. The admonition of such a monitor, it would be impossible to disregard. This system in the absence of external forces must infallibly give its signal. I believe I have answered all of Mr. Blodgett's technical objections. I can substantially disprove them by an application of my system, or even by an exhibition of my model. The remaining objections as to the item of expense and equipment really do not need any defense. To fair and practical critics I can at once show that these are but minor matters in contrast with the service and security given. Mr. B. might with as much reason apply these objections to all the long list of details that go to make up the general equipment and management of a well-regulated road. The leading and most expensive feature of my system—the telegraph line—every road is already equipped with, and I have but to run my wires and make my connections, after having had the other details made. To be entirely frank, it is among the least of my anxieties that railroad officials will object to the comparatively small expense of equipment.

H. J. PALMER,
Inventor of Palmer Signal.

The Inter-state Commerce Commission and Transcontinental Rates.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am interested in all doings and sayings of the Inter-state Commerce Commission, so when I read your editorial note of June 14, about the dispatches from Washington, which you said were inspired by the Commission, I looked for them and found them, as I suppose, in the New York *Evening Post* of June 10. When I read these despatches I thought your comments were very mild indeed. A more ingenious statement of a position I never read than this of the Inter-state Commerce Commission as set forth by this *Post* correspondent. They *do* allow for water competition and foreign competition according to the famous Louisville & Nashville case, but at the same time they *don't*. That's about the argument as I understand it. Let me quote a sentence: "It may be true that the Transcontinental roads have come more nearly into conforming with the long and short haul clause of the statute than the roads south of the Ohio River, *though this is doubtful*, notwithstanding that their business is less affected by water competition."

First, as to the doubt expressed as to much violation of the short haul clause on roads south of the Ohio River. Below I give instances which illustrate these violations:

	First-class rate.
New York to Jacksonville, Fla., through Waycross	$0 65
to Waycross, Ga.	1.12
New York to Charleston, S. C., through Florence, S. C.	.70
to Florence, S. C.	1.04
New York to Wilmington, N. C., through Goldsboro	.70
to Goldsboro, N. C.	1.05
New York to Mobile, Ala., through Montgomery	.75
to Montgomery, Ala.	1.14
New York to New Orleans, through Meridian, Miss.	.70
to Meridian, Miss.	1.14
New York to Vicksburg, Miss., through Meridian	1.00
to Meridian, Miss.	1.14
New York to Memphis, Tenn., via Chattanooga	1.00
to Chattanooga, Tenn.	1.14

All this is well known to the Commission, for in the opinion filed March 30 last by Commissioner Walker in the matter of Southern tariffs, an exhaustive examination is made, and changes are suggested where *land* rates violated the short-haul rule. As to water competition the opinion says: "In cases where actual water competition exists which is of controlling force in respect to traffic important in amount *entitling* the carrier, under what the Commission believes to be a liberal though just construction of the statute, to charge less for the longer than for the shorter haul over the same line in the same direction, the question still remains as to the disparity which may properly be allowed." This is an acknowledgment of the rightfulness of a smaller charge for a longer distance, and is in accord with the theory which the Commission has always held.

The point now arises: Is there water competition between California and the Atlantic seaboard? As to this I am able on the authority of the Cutting Fruit Packing Co., of San Francisco, to give the actual rates paid on a shipload of canned fruits which left that city for New York in May by sail.

	Cents Per 100 lbs.
Sail from San Francisco to New York 2,300 tons of 2,240 lbs. each at $6.95 per ton	.3105
Add 5 per cent. contingent expenses	.0153
Add 4 months interest at 7 per cent. on $1.75 per doz	.0123
Add insurance at 1¼ cents on $1.75 per doz	.0083
Total per 100 lbs.	.3464

As against a rail rate of $1.5 Let us assume that this rail rate of $1 will get the business as against 35c. by sail. This assumption is not correct because the $1 rate is as low as cost of service will allow, and is not intended to take everything away from the foreign importers or the sail vessels. The Cutting F. P. Co. estimates that only 8 per cent. of the California products reach the territory east of Buffalo and Pittsburgh. This must be an error, but I have not the correct figures at hand; but at any rate the $1 is a low rate to be applied to all the interior traffic, which at the best pays a little less than a cent a mile per ton.

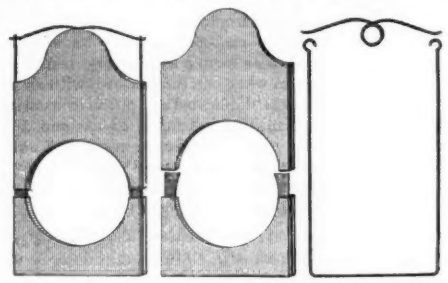
Now this is exactly what the commission has ruled, that the San Francisco-New York rate must not be exceeded to or from any interior point. In September last the Transcontinental Association put tariffs in force quoting lower rates between the seaboards. They had had, as they thought, secured beforehand the unofficial approval of the commission. These tariffs, numbered from 8 to 15, were declared void by the commission, because the interior cities naturally thought they ought to have the New York rate. The disparity may have been too great, but to decide that the rate must be the same—was this in accord with the commission's theory of water competition repeatedly affirmed? The result is that the maximum rates of the seaboards become the minimum interior rates.

To all this must be added the competition of the Canadian Pacific. What this road can do if it chooses is far beyond anything it has yet done. One or two things show this: It has just transpired that this Canadian road took from California to the east 59 per cent. of this season's wool clip. What has been done with wool can be done with anything else. If our roads had made a lower through than local rate on wool to get these shipments would the Inter-state Commission have sustained them? It must be reluctantly admitted that it is doubtful, and it is unjust that there should be any doubt about it. The same is true of the tariffs of last September. The coast rates should not be made the minimum for interior rates. Justice to our transcontinental roads demands it. The wishes of the interior towns should not compel a violation of an often expressed principle.

TRAFFIC DEPARTMENT.

The Stier Dust Guard.

We illustrate herewith the Stier dust guard for journal boxes. As shown in accompanying cut the simplicity of this dust guard is at once apparent, and it is said to be attracting a great deal of attention from the fact that it is cheap and is applicable to any oil-box. As will be seen, the guard is made of wood and in two sections, held together by a wire yoke in a groove, the ends of the yoke being caught by a wire spring at the top. While there is no considerable



pressure, the two sections of the guard are always drawn together, preserving a close fit around the axle. When the journal box is to be put on or taken off the axle, the spring at the top of the dust guard may be released and the upper section lifted out to avoid breaking the guard, as is often done when a plain dust guard is used.

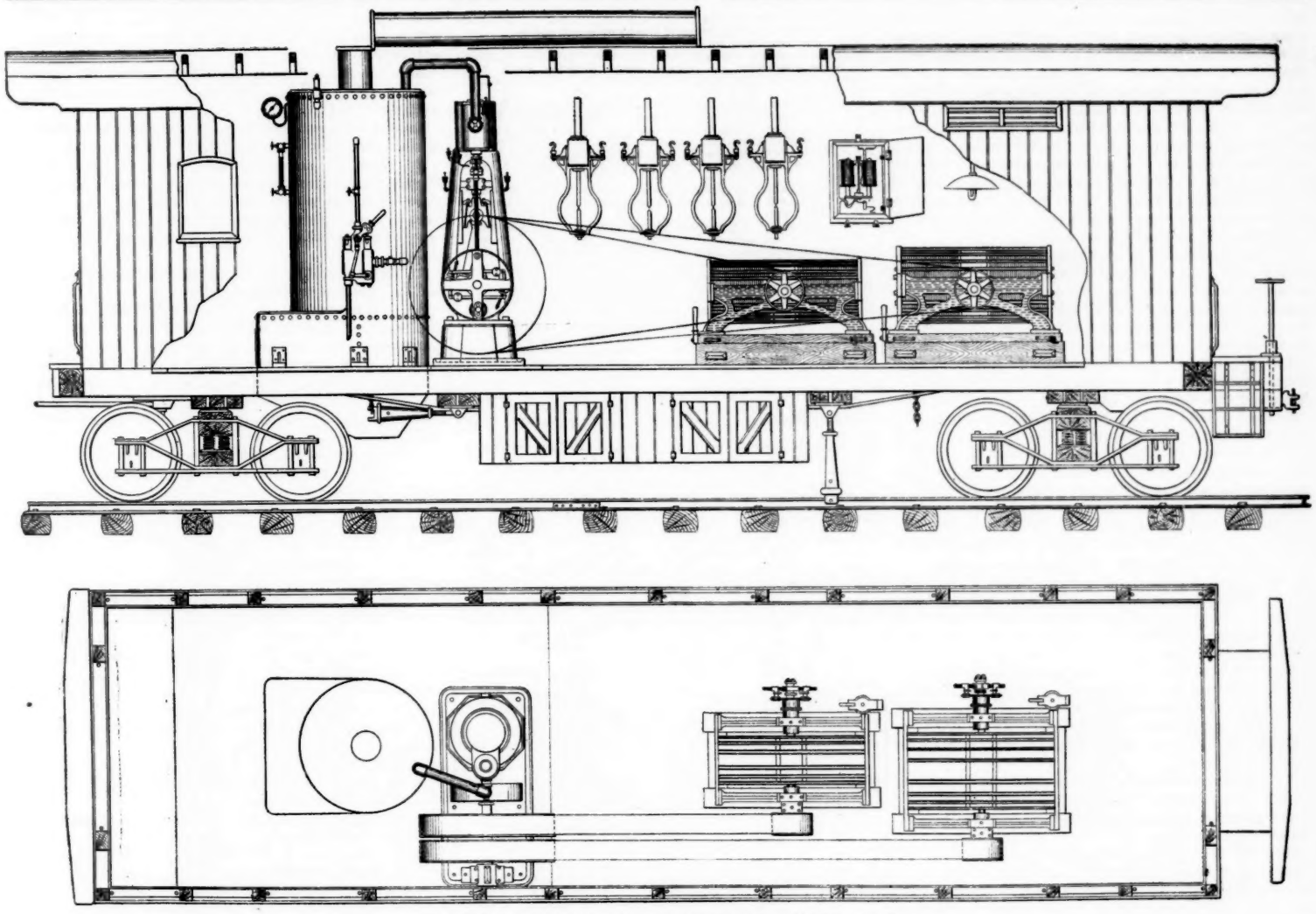
This dust guard has been carefully tested and proved to be effective, the wheels being unusually clean, showing that there was a saving in oil by its use. Reuter & Mallory, of 22 Light street, Baltimore, Md., are the manufacturers.

Increased Capacity of German Freight Cars.

About 1870 some coal railroads in Prussia ventured to increase the capacity of a number of open freight cars from the standard, 22,000 lbs., to 27,500 lbs., and of a few even to 33,000 lbs.—cars with two axes, it must be remembered. In 1880 one railroad management in East Prussia had 2,260 cars whose capacity had been increased to the former quantity, the change being made in a few months, and at an average cost of less than $8 per car. As these cars already had axles of 5.2 in. diameter in the wheel seat, and most of them had strong enough springs, the only considerable change necessary was raising the side boards and strengthening some of the springs.

The cars were found so satisfactory that in 1881 a thousand more similar cars were provided. It was then proposed to make this the standard for open coal cars for the Prussian state railroads, and no objection was made to the proposition by those in charge of rolling stock and operation, but the administration rejected it on these grounds: 1. The public was accustomed to ordering coal in quantities of 22,000 or 44,000 lbs. 2. The introduction of a new kind of cars would make the operation of the roads more difficult. 3. The freight rates were based on the 22,000 lbs. car-load as a unit. 4. It would facilitate frauds in weights. 5. The danger of over-loading would be increased. 6. The moving of cars by hand by yardmen would be made more difficult. 7. It would not be so easy to unload cars with the higher sides. (A caviller might perhaps say that these are purely bureaucratic objections.)

However, in the eight years that have elapsed since, the



ELECTRIC LIGHTING CAR—CUMBERLAND VALLEY R. R.

number of cars of 12½ and 15 (xilometric) tons capacity on the East Prussian state railroads has increased to more than 4,000, and the objections made to them have not been realized; and in 1887 one of the leading Austrian roads put on a thousand of them. Now it is claimed that the first cost and the cost of maintenance is substantially no greater for the 12½-ton than for the 10-ton car; and the same load requires less track room; that the large cars cost no more for switching, etc., per car, and that they have the other advantages of large cars which our experience with them for ten or fifteen years has shown us so clearly that for a long time we haven't built any others. A prominent German railroad official now not only recommends their general adoption for coal traffic, but he even proposes that box cars be made of the same capacity, and urges it as likely to make possible a reduction in freight rates.

As we succeed in carrying loads of 60,000 lbs. on four axles, and in some cases 10,000 lbs. more, there is no reason to believe that the Germans will be safe in making even box-cars to carry 27,500 lbs. on two axles.

Schwabe, the author of this proposition, publishes a table showing the total weight of load of trains of cars 10, 12½ and 15 tons which a given locomotive can draw on different grades, from which it appears that with 12½-ton cars it would haul from 6.8 to 8.3 per cent. more net load at a speed of 18½ miles an hour, and with 15-ton cars from 10 to 12½ per cent. more than with 10-ton cars. He gives the weight of the cars themselves as 11,200 lbs. for 10-ton, 11,500 for 12½-ton, and 11,800 for 15-ton cars.

The Berlin Railroad-Science Society has offered a prize of 1,000 marks ($240) for the best paper on the subject.

Electric Light Car.

Since 1881 the Cumberland Valley Railroad has used a car fitted with a dynamo and the necessary apparatus for lighting picnic and excursion grounds. The car which is illustrated in this issue was recently completed, and since the flood has been used by the Pennsylvania Railroad in the work of repairs of line and bridges. It was used during the building of the temporary bridge at Montgomery, and will be taken to other parts of the line.

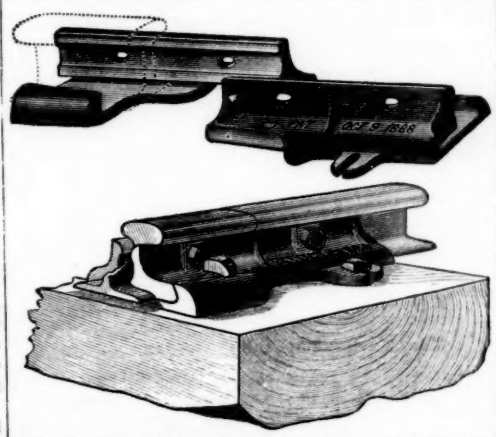
The car is 33 ft. long, 9 ft. wide and 13½ ft. from the rail to the top of the roof. In one end are the boiler and engine, and in the other the dynamos. The car is also equipped with folding beds, cupboards and all conveniences for the employés. Under the car the lamps are carried and the tools for erecting the line. A locomotive tender is attached for the purpose of carrying coal and water for the engine, and also the poles, wires, hoods for lamps and other fixtures for the line.

The boiler is 40 horse-power and the engine is a 35 horse-power vertical automatic built by the Taylor Manufacturing Co., of Chambersburg, Pa. The engine and boiler stand on a cast-iron floor plate 9×11 ft. The weight of engine, boiler and floor plate is 15,500 lbs., and the total weight of the car and machinery is 53,000 lbs. The dynamos used in this car are Thomson-Houston, one of 25 and the other of 15 arc light capacity, each lamp of 2,000 candle-power.

This car was built at the Chambersburg shops of the Cumberland Valley Railroad, and has now been in operation about a month, and the machinery is said to have worked very satisfactorily. This make of vertical engine appears to be well designed to stand the severe work of electric lighting. An outfit of this sort is of such obvious usefulness for many purposes in railroad work, not only in peace, but in war, that it is surprising that it has not been more generally provided.

The McKenzie Rail Joint.

This joint has undergone somewhat limited trials for a year or more, and so far as we have learned, with success. It consists of but two pieces of malleable iron and two bolts. The plates interlock with each other in such a way as to support the base and head of the rails vertically, and also to hold them in line laterally. As put down for trial on several



roads the vertical members of the joint are drilled for two bolts. Bolts seem hardly necessary, however, except in places where rails creep much, for the rails are held very tightly in the chairs. Without bolts the rails might, under unfavorable conditions, creep through the joint, or cause the two parts to separate. In applying the joint the two parts are slipped over the rails and driven with a spike maul to a tight fit.

How tight this fit is depends, of course, upon the pattern of the joint, but in the cases which we have seen it is such as to require great force to drive the plates home, and the rails are held securely to line and level. It cannot be said without further trial than we have seen whether or not the rigidity just at this joint will cause increased local wear of the top of the rail. That must be a result where much metal is massed, at the joint or elsewhere, forming an anvil.

The Steamer "Puritan."

This latest addition to the fleet of the Fall River Line made a trial trip from New York on June 13, carrying a number of invited guests. The vessel steamed down the bay, outside of Sandy Hook, affording the passengers a glimpse of the regatta of the New York Yacht Club, and then returned, going some distance up the North River before making fast to the wharf at the foot of Murray street. The vessel turned four times during the trip, giving a good opportunity to test her steering qualities; and, judging from her performance on this occasion, she obeys the helm with unusual promptness for a vessel of her size.

The length of the "Puritan" is 420 ft. over all, and 404 ft. on the water line, the beam is 52 feet over the hull, and 91 ft. over the guards; moulded depth, 21 ft. 4 in., and height from base-line to top of house over engine, 70 ft. The displacement is 4,150 tons, and the gross tonnage 4,650. The design is somewhat similar to that of the "Pilgrim," but the "Puritan" is much larger, and contains 364 state-rooms. The hull is composed of mild steel, and is double, being divided into 52 water-tight compartments; and the internal hull has 7 water-tight bulkheads. The decks are also made of steel covered with wood.

The boiler-plant of the "Puritan" consists of 8 tubular boilers of the Redfield type, which may be described as one or more fire-tube cylindrical boilers inclosed by water-spaces or walls, instead of brick-work. The cylindrical shells are 7 ft. 8 in. in diameter, and there are 6 boilers with double and 2 with single shells. There are 22 furnaces, with 850 sq. ft. of grate surface, and the heating surface is 26,000 sq. ft., there being 1,384 tubes, each with an external diameter of 3¼ in. There are two smoke-stacks, each about 10 ft. in diameter and 90 ft. in height above the grates; and each chimney is fitted, near the bottom, with a superheater, through which the products of combustion pass, and around which the steam generated in the boilers circulates on its way to the cylinder. There is also a donkey-boiler on the main deck. The "Puritan" has a compound beam-engine, the two pistons being driven by links attached on one side of the beam-centre, the air-pump links and connecting-rod being attached on the other side. The cylinders are set fore and aft, the high-pressure cylinder being in the rear. There is a receiver between the two cylinders, 20 ft. long and 3 ft. 5 in. in diameter. The engines are fitted with side-pipes and double puppet-valves, as is customary in the case of beam-engines: and Sickel's cut-off (the type which trips the valve when rising, thus limiting the adjustable cut-off to half-stroke) is fitted to the steam-valves. The cut-off of either cylinder can

be adjusted or thrown out of gear independently of the other, and when ungeared, the toes cut off the steam at about ⅝ stroke, so that the engine has a wide range of adjustment. The boilers are designed for a working pressure of 110 lbs. per sq.in., and it is expected that with this pressure the engine will make 24 revolutions a minute and develop 7,500 horse-power. On the occasion of the trial trip the engines were not run to their full capacity, the boiler pressure varying from 70 to 75 lbs. par sq. in., and the revolutions per minute from 18 to 20. An observation made during the run showed that with a boiler pressure of 70 lbs. per sq. in., a pressure in the receiver of 12 lbs., and a vacuum of 27½ in., the engine made 18⅓ revolutions a minute.

The boilers are fed with fresh water,and surface condenser with 15,000 sq. ft. of cooling surface being used. The air pump is driven from the main beam, and there are 2 centrifugal circulating-pumps. The feed-pumps are actuated by the cross-head of the air-pump, and there are also independent steam-pumps. Other auxiliary steam engines are provided for driving ventilating-blowers, steering-engines, steam-capstans, starting engines, and dynamos capable of furnishing electricity for 1,600 incandescent lamps. The "Puritan" is fitted with feathering paddle-wheels inclosed in steel wheel-houses. Each wheel has 13 steel buckets, 14 ft. long, 5 ft. wide and ¾ in. thick; the diameter of the wheels, over buckets, being 35 ft. The masts are of steel, 22 in. in diameter, and are used as ventilating-pipes, being hollow.

The engines are provided with the usual starting-bars and trip-shafts, which can be used in case of emergency ; but a starting engine is also provided to work the valves when the eccentric-rods are unhooked. The ashes are discharged from the fire-room by hydraulic pressure, and it will be seen from the foregoing description that all the operations which are performed on smaller steamers by hand—such as operating the engine when unhooked, hoisting ashes, weighing anchor and steering—are here performed mechanically. The hull of the "Puritan" was built by the Delaware River Ship and Engine Building Co., and the machinery by the W. & A. Fletcher Co. It is expected that the coal consumption will be 120 tons on the round trip to Fall River and return.

The dimensions of the cylinder and some other data are appended.

The high-pressure cylinder is 75 in. in diameter, and 9 ft. stroke; low-pressure, 110 in. diameter, 14 ft. stroke. The working-beam is the largest ever made, 34 ft. long between centres and 17 ft. wide.

The diameters of the principal journals are as follows: Beam centres, 19 in.; main bearings, 27 in.; outboard bearings, 30 in.; crank-pin, 19 in., with a length of 22 in. The gallows-frame is formed of steel plates riveted together and strongly braced. When the machinery is in operation there is one engineer on watch, two oilers, one water-tender, eight firemen and six coal heavers. The arrangements for delivering coal in the fire-room are very convenient, a large bucket being suspended from an overhead rail which runs the whole length of the fire-room and communicates with the coal-bunker.

The trial trip was a most enjoyable one, the weather being very pleasant, the company select and limited in number, so that there was no crowding, the luuch elegant and abundant, and under the influence of the champagne or the cigars, some of the enthusiastic guests uttered the wish that the Fall River line would have a trial trip every day. The writer is indebted to the Chief Engineer, Mr. Charles Weed, for many courteous attentions.

Standard Box Car, Chicago, Burlington & Quincy.

The freight car shown in accompanying illustrations is one designed by the mechanical department of the Chicago, Burlington & Quincy for loads of 50,000 lbs. for regular heavy service. Its rating is 34 ft. box car, 50,000 lbs. capacity, light weight 27,300 lbs., clear width inside 8 ft. 2½ in. The general dimensions of this car are given in the drawing. Extracts from the specifications appear below. Comment upon cars of this design will be found in the editorial columns.

SPECIFICATIONS.

Length out to out of sills	34 ft.
Width out to out of sills	8 ft. 9 in.
Bottom of sill to top of plate	7 ft. 10 in.
Top of sill to bottom of plate	6 ft. 7 in.
Length inside in the clear	33 ft. 5⅛ in.
Width inside in the clear	8 ft. 2½ in.
Side door opening clear	5 ft.
Out of end sill to centre of bolster	5 ft.
Wheel base of truck	5 ft.
Top of rail to centre of draw bar (empty)	2 ft. 9 in.

The construction of the car both in plan and detail, is plainly shown in 15 drawings which form a part of this specification, and to which strict conformity will be required. The following is a list of the drawings accompanying this specification:

Standard sections of material; general plan standard 34 ft. box car; wrought-iron details; cast-iron details; additional cast-iron details; draw-bar; truck No. 10, general plan and details; journal-box, bearing and key; hand-brake for freight cars; 33-in. wheel; diagram of wheels and axle; lettering; details of wood construction; grain doors; side and end doors.

List of particulars and supplementary specifications which accompany the general specification: Axles, draft springs, truck springs, round bar iron, flat bar iron, coupling pins, coupling links, Norway sills, Norway flooring.

The material herein named must meet the particular specifications above mentioned

Lumber.

The quality and kind of lumber in the different parts shall be as follows:

Hard Norway Pine—Well seasoned, free from sap on three corners of each end, to have no large or loose knots and no splits. To be used for *side plates, ridge pole, purlines, side and end mouldings, door caps.* Special specification No. 39 is furnished for sills, and No. 40 for flooring.

"C" Norway flooring—Ceiling (inside).

White Pine "A" Flooring Strips and Better—Roofing 6 in., siding 2 in. to 4 in., and door panels 4 in. wide.

Common Pine (either White or Norway).—Running boards and grain doors.

White Oak—For end sills, draw timbers, cross-ties, posts and braces, carlines, end plates, side and end girths, buffer blocks, door frames, door stops, sill under doorway, ladder posts, post strips, roof saddles, truck bolsters, spring plank. To be sound and dry, free from sap, large or loose knots and splits.

Bolts and nuts are to have U. S. standard proportions and threads. Post-rod washers to be not less than 3-16 in. thick nor 2½ in. diameter. A sample board showing nuts, nails, washers, lag screws, etc., will be furnished by the railroad company.

Roof.—To be double board ⅞ in. × 5¼ in., finished white pine, dressed and grooved ; secured to band molding by two No. 16 3-in. screws, and to purlines by six No. 16 2½-in. screws in each board of the upper course. The screw holes are to be bored, and screws entered by screw-driver only. The bottom course to be nailed with 6d cut nails, two nails to each board bearing.

Carlines framed without tenons, simply resting on top of plates notched down on same 1½ in., and secured by two 30d nails in each end.

The purlines are let into end plates and carlines, secured to the plates by 20d nails and to carlines by 12d nails—two nails at each intersection. The ridge pole is fastened to carlines and plates by 30d nails, two nails in each bearing.

Floor to be Norway pine, 1¾ thick and 5½ in. or 7½ in. wide, finished, matched and surfaced on top side, secured to sills by two 30d nails to each sill, for 7½ in., and one 30d. nail for 5½ in. See special specification 40.

Siding.—To be ¾ in. white pine, dressed, matched and beaded, not less than two inches nor greater than four inches wide when finished, exclusive of tongue, secured to frame by 8d wrought nails in plates and sills, and 6d wrought nails in girths. Nails to be driven in each plate, girth and sill. No nails to be driven in braces.

Ceiling.—"C," Norway pine flooring, secured by 6d wrought nails. Strips to be continuous each side of doorway.

Side Molding.—Norway pine, 1¾ in. × 3¾ in., secured by 40d cut nails.

End Molding.—Norway pine, 1¾ in. × 10¼ in., secured by ½ in. bolts.

Running Boards.—The saddles to be oak, 2 in. wide, spaced not more than 2 ft. centres, secured to roof by two No. 16 2½ in. screws, one in each beveled end. The side boards 1 in. × 6 in., common pine, secured to saddle and roof with two No 14 1¾ in. screws at each bearing. The centre board, 2 in. × 6 in., common pine, secured to saddle and roof by two No. 16 3 in. screws at each bearing.

Brake.—The car brake rigging is arranged so as to admit an automatic air brake, with slight changes. Hand brake operated from one end of car.

Truck.

Wheels.—The truck wheels are to conform to pattern shown on print No. 334, and to weigh 555 lbs. before bored. Guaranty, three years' time or 50,000 miles service. The pressure used in mounting wheels and axles to be not less than 50,000 lbs. nor greater than 60.000 lbs. at final stroke of press.

Axles.—To be M. C. B. standard, and satisfy special specification.

Journal bearings are to weigh 9 lbs. each, exclusive of lead lining, and 10 lbs. with lead lining; to be made of copper 16½ parts, tin 2½ parts, and zinc 1 part. To be lined with lead.

Marks.—The wheels, axles and journal bearings to be plainly marked the month and year they are placed in service. This marking to be stamped on or prick punched on the inside of wheel and both ends of each axle. The initials of the maker of the axle will be stamped about the centre of the axle. Bearings are to have the initials of the railroad cast on the top, and the date put in service stamped where it will not wear off.

Brakes.—Both trucks to have brakes as shown. The brake shoes to be of the Master Car-Builders' Christie pattern.

Painting.

The mortises and tenons on posts and sills, the top of sills and the outside face of side sills to have one coat of mineral paint before these parts are covered. The cross ties and draw timbers to have one coat of mineral paint all around for a distance of two feet at outer ends.

The Roof.—Each surface between the courses to have one heavy coat of oil paint, the top surface to have two heavy coats of the same paint, the last coat to be sanded.

The Body.—To have two coats of oil paint. The iron work to have one coat of lampblack in oil. The lettering to be painted with two coats of white lead. The trade mark to have two coats of lampblack in oil.

"Capacity, 50,000 lbs."—Is to be stenciled in black on the inside at the left of side door, and the railroad initials in black, to be stenciled on all grain doors.

The Number of the Car.—To be stenciled on all four plates inside the car. The grain lines are to be ½-in. wide. The wheat and oats lines to be black, and the corn line red.

The Trucks are to have one coat of mineral in oil all over inside, and one coat of lampblack in oil on the outside, and to be stenciled as shown on print No 284.

Conclusion.

The car throughout is to be built of sound and good materials. All lumber to be well seasoned, and all work must be done in a substantial and workmanlike manner, to the satisfaction of an authorized inspector of the railroad company.

Sample Car.—A sample car, built to these drawings and specifications, will be sent to the works of the contractors, and all details not fully described here must be made similar to it.

Weight of Iron in Car Body.

Brake rods and hardware for same	1821½ lbs.
Carriage bolts	91½ "
Nuts	121 "
Washers	961¼ "
Castings	1,581 "
Flat and round iron	2,1803¼ "
Lag screws	201¼ "
Nails	109 "
Bolts	261 "
Rods	3021½ "
Screws, 1,744 in all.	
Total wrought iron	2,6311¼ "
Total cast iron	1,561 "
Total hardware	6581½ "
Total iron in one car: body	4,8503¾ "

Weight of Material for Two Freight Trucks.

Bolts	1771½ "
Rivets, lag screws, etc	651¼ "
Keys	77⅛ "
Washers	91½ "
Nuts	471⅛ "
Iron	4,1591¼ "
Castings	6,480 "
Weight of wrought iron for two trucks	4,4663¼ "
Weight of cast iron for two trucks	6,480 "
Total	10,9463¼ "
Actual weight, including lumber	11,500 "

The Master Mechanics' Convention.

The twenty-second annual convention of the American Railway Master Mechanics' Association, held at Niagara Falls, was called to order at 10:20 a. m. Tuesday, June 18.

President Setchel made an admirable address, briefly outlining the objects which the Association should chiefly seek to attain, and pointing out a few of the improvements in mechanical practice that have been greatly promoted by the investigations and discussions of the Association. He laid it down as a principle that the object of the Association should be not so much to establish standards as to promote investigation.

The reports of the Secretary and the Treasurer showed a present membership of 333. The net gain has been nine members in the year. The receipts were $3,210 and expenditures $2,302; balance $908.

A Nominating Committee was appointed consisting of Wm. Swanston, (C., St. L. & P.); R. W. Bushnell, (B., C. R. & N.); Allen Cooke, C. & E. I.); J. M. Boon, (West Shore), and John Hickey.

Messrs. J. Davis Barnett (Grand Trunk), J. N. Lauder (Old Colony), and W. H. Lewis (D., L. & W.) were elected as Auditing Committee.

The first discussion was topical, on the question of bursting of steam chests, introduced by Mr. O. Stewart (Fitchburg).

Mr. STEWART finds that these accidents occur most often on a down grade, when the engine has been reversed in face of some obstruction, and very shortly after the valves have been copiously oiled by the old method. He thinks the cause is to be found in the generation of a gas which is exploded.

Mr. LAUDER (Old Colony) thinks such accidents come from faults of material or design.

Mr. MACKENZIE (N. Y., C. & St. L.) thought from his own experience that a greatly increased pressure occurring immediately after reversing, was the cause of bursted steam chests; and Mr. Lauder agreed that this might sometimes be the case. With the throttle valve now in ordinary use, the throttle should be opened a little, after reversing, to let the back pressure from the cylinders acting as air pumps back to the boiler.

Mr. STEWART thought that this does not explain the fact that such accidents happen after oiling, and not when the engine is reversed under other conditions. He had lately seen both steam chests blown off by reversing on a 50-ft. grade.

Mr. J. F. LYNE: There may well be a gas formed which will explode spontaneously. Instances of explosions in the electric wire conduits in New York were cited, where gas leaked in and was exploded without the aid of fire or heat.

Mr. J. M. BOON (West Shore) : These failures may all be accounted for by weakness. The steam chests on the original locomotives of the West Shore have burst badly and probably all of those on 160 engines, class B, have been changed. Since better designed steam chests have been used there have been no such failures.

Mr. Sinclair, Mr. Wilson and others thought that faults of design or material were the probable cause.

Mr. GEORGE GIBBS (C., M. & St. P.): It is quite conceivable that a volatile gas is formed and exploded by the heat from compression or by a spark.

The next topic discussed was the Dimensions of Axles for Tenders of Heavy Capacity.

W. H. Lewis (D. L. & W.) showed blue prints of an axle designed for a 60,000-lb. car, and Mr. Harrington (Erie) showed a truck designed by Mr. Ross Kells for heavy cars, showing some modifications in the dimensions of the axle. Mr. Lewis' axle is 6 ft. 3½ in. c. to c. of journals; journals, 4 × 8 in.; 7 ft. 0¾ in. over all and ¾ in. from back of box to wheel. The discussion was pretty desultory, and was put over till Wednesday morning that Mr. Lewis might bring blue prints.

Mr. LAUDER is using a journal 4¾ × 8 for heavy tenders, Johann design of axle. He thinks that in designing an axle for 60,000-lb. cars, 4 in. would be too small a journal.

Mr. THOMAS (East Tennessee, Virginia & Georgia) is using a journal 4½ × 8 in., collarless, with solid brasses; axle 6 ft. 3 in. c. to c. of journals.

Mr. CHAS. BLACKWELL (recently Central of Ga.) mentioned the difficulty of packing where a collarless axle is used with end stop. He had had excellent results with brasses cast with a lip to form their own end stop.

Mr. WILSON (U. P.) told of the recent experience of that road which had led to the substitution of the Bissel stop for the form of brass described by Mr. Blackwell. It was concluded that the end thrust against the lip caused increased pressure on the inner end of the brass, and hence unequal wear and heating.

Mr. GEO. GIBBS concluded that theoretically the present M. C. B. standard journal is strong enough, but that greater bearing surface must be had to provide against heating, and the mechanical department of his road would recommend a journal 4½ × 7½ with collar. The collar is needed with the diamond truck to prevent distortion of the truck under the end thrust.

The discussion of both Tuesday and Wednesday has been summarized in the foregoing abstract.

The Committee on Purification, etc., of Feed Water had no report to make, and was discharged. A letter from Mr. W. Wilson (C. & A.), commending the Smith feed water heater, was read and referred to the committee yet to be appointed.

The report of the Committee on Tires was then read, as follows:

TIRES.

On the advantage, or otherwise, of using thick tires, circulars were issued to members, containing a series of questions, to wit:

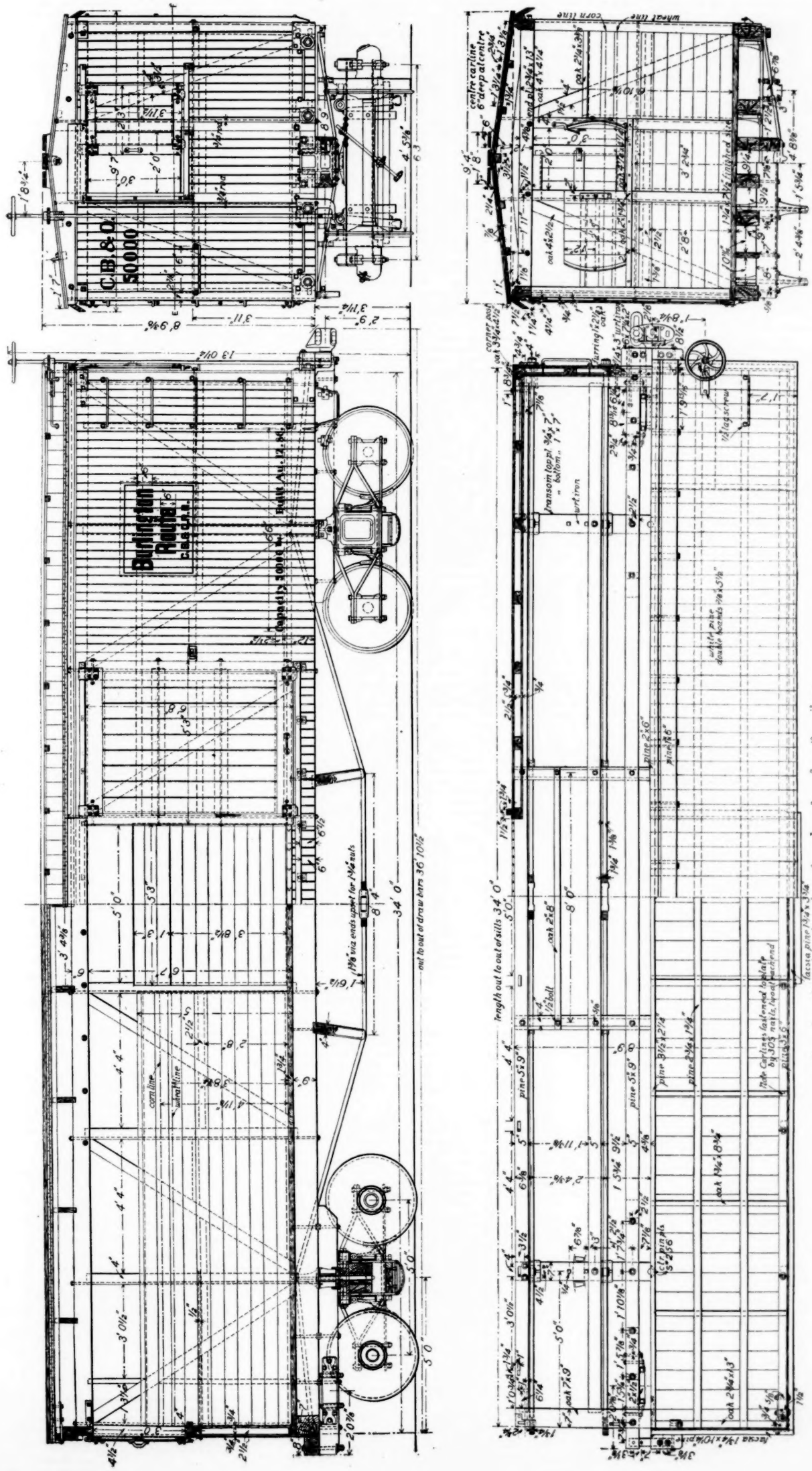
First.—Please furnish a tabulated statement showing mileage made by a series of heavy and light tires of the same make, upon a form similar to the one inclosed.

The statement given herewith shows the average mileage made per sixteenth inch wear of tires of the same brand and thickness under engines of the same type, weight, size of drivers, etc.

Of the nine statements at hand, only the Chicago, Burlington & Quincy, and the Chicago, Rock Island & Pacific show comparisons between tires of 3 and 4 inches in thickness.

Both of these result, however, in favor of the 3-in. tire, showing for them average increased mileage per unit wear of about 20 per cent. In general the reports received are rather conflicting, and it can scarcely be said that there is any difference in the wearing qualities of the material in the outer rim, inner rim, or inside centre core of the same tire. In comparing the mileage of tires, vaying from 2¼ to 3½ in. original thickness, the thinner ones have averaged a trifle better, although in many cases the thicker ones gave very good results.

Second, Can you give any figures showing the amount of



STANDARD 34-FT. BOX CAR—CHICAGO, BURLINGTON & QUINCY.

wear to tires occasioned in handling engines by different engineers?

At the last convention it seemed to have been almost a unanimous feeling that the engineer was greatly responsible for the condition of his tires, and of those who expressed their ideas in figures, the lifetime of a tire might be increased from 25 to 100 per cent. by careful handling. The only figures given in answer to this question are by the Illinois Central Railroad. The comparison made gives the mileage of three engines in suburban service. These engines are of the "Forney" pattern, built at the same time and to the same drawings. They are equipped with driver-brakes with the plain shoes, and have the same brand of tires 3½ in. thick. The service is such that each engineer makes the same number of trips over the same part of the road each day with the same number of cars, stopping on an average of every two minutes. Every precaution was taken through out to make all the circumstances and conditions connected with the running of these engines alike.

The engineers, all of whom are good, conscientious men, were notified that a comparative record of their tires would be kept, and each man was to do his utmost to make a large mileage. The following is the result to date: The first engine made 103,618 miles to $\frac{1}{16}$ inch wear of tire, an average per unit wear of 7,400 miles. The second made 111,345 miles to $\frac{14}{16}$ in. wear, an average per unit wear of 4,635 miles. The third made 112,455 miles to $\frac{25}{16}$ wear, an average per unit wear of 4,243 miles. The average of the remaining 14 engines of the same type and service was less than the third case above mentioned.

Fourth. To what extent does the condition of tires influence the taking of an engine into shop for general repairs.

A large majority of answers to this question were, that the condition of tires directly governed the time between repairs of engines.

Fifth.—In determining the advantage of a thick over a thin tire or vice versa, do you take into account the expense of turning tires?

It has been claimed by many that a thick tire is cheaper or better on account of the lesser percentage of material scrapped after being worn out and the consequent increased percentage used in wear. All other things being equal, and taking into account the original cost, crediting this with the scrap after tire is worn out, a 4-in. tire will cost 10.9 per cent less per thousand miles run than a 3-in. tire.

Sixth.—What is the cost at your shop of disconnecting an engine, taking out wheels, turning tires and replacing wheels ready for service?

This amount varies from $14 50 to $37. As a rule, the condition of tires causes an engine to be taken into shop when otherwise she would have made in many cases from 20 per cent. to 50 per cent. more mileage before requiring repairs to machinery, but being in for tire turning, and different parts of the machinery taken down, it is generally considered advisable to do a limited amount of work to the machinery, so that it will not be necessary to hold the engine for this work before she comes in again for tire turning, and it is safe to say that quite a large portion of the expense of repairs to machinery is directly caused by tire wear.

Seventh.—In conclusion, state the reason why you think a thick tire better than a thin one, or vice versa.

Though the records of wear of thick and thin tires received could scarcely be taken as a general average, it is all the committee have to consider. This wear showed about 20 per cent. more mileage in favor of the 3-in. tire, whereas, in comparing the cost, we find the 4-in. tire is 10.9 per cent. cheaper than a 3-in. tire. Now, with all the other influences incidental to tire wear, such as use of sand, slipping drivers, use of driver-brake during the same period, the fact that one set of tires will do much better than another set of the same brand and thickness under the same engine handled by the same engineer, the diversity of opinions of the members of this association, the committee find it very difficult to say with any degree of certainty which of the two is the better.

The Illinois Central has prepared a statement showing the performance of 252 sets of tires of the same brand, varying from 2¼ to 3½ in. in thickness, in all kinds of service. The total mileage was 45,698,728 miles, and the total wear 3,988-sixteenths, an average of 11,459 miles per unit of wear. Another statement shows the performance of 33 sets of tires of another brand varying from 2¼ to 3½ in. in thickness, all but two sets having been in passenger and freight service. The total mileage for these was 5,087 042 miles, and the total wear 621.5 sixteenths, an average of 8,185 miles per unit wear. Although the original cost of the former was 7¾ cents per pound, and the latter 5¼ cents per pound, a difference of 32.2 per cent., the cost per 1,000 miles run of the former was 12 78 cents and the latter 12.19 cents, a difference of only .59 of one cent, and taking into account that the cheaper tire required to be turned five times, whereas the former only required four turnings during the same period, aside from losing the service of the engine during the fifth turning, it will be seen that the former is considerably the cheaper tire, although at a great difference in original cost.

The committee concludes, taking into consideration all the circumstances and conditions of the report, as well as personal observations not mentioned herein, that they cannot see any benefit or advantage to be derived in using thick tires.

We therefore recommend to the members of this Association that tires 3 in. in thickness, of the best quality of material, would be the best and most economical for railroad purposes.

We take this opportunity to thank those members of the Association who have kindly contributed to this report, and make special mention of the kindness of Mr. J. N. Lauder, through whom the paper on tire metal was secured.

HENRY SCHLACKS, Chairman.
C. E. SMART,
J. W. STOKES.

This report was accepted with a vote of thanks. There was no discussion. This was followed by the report of the Committee on Driving and Engine Truck Boxes.

DRIVING AND ENGINE TRUCK BOXES.

Your committee on "Driving and engine truck boxes, best form and material, including journal bearings and manner of fastening same in box," would report that they found these subjects had been pretty well covered in a report to the association at the Washington meeting. Driving boxes are made of cast iron, cast steel, bronze and brass. When made of strong, close iron of good design, cast iron will give good results. In many cases where cast iron is used, the box is not properly proportioned from a desire to use the same size pedestal and box as used for lighter class of engines, or using a larger driving shaft, the box is reduced and made too light, and breakage is the natural result. The weight of locomotives is steadily increasing, yet it is not unusual to find a driving box on an engine weighing 50 tons but little heavier than one for a twenty-five or twenty-eight ton engine. This is one cause of driving boxes breaking. Another is from the desire to have as wide a fire-box as possible; the frames are thrown out, space reduced between frames and hub of driving wheels making light flange on driving boxes, broken flange the result. When the fire-box is set on top of frames another trouble develops, that is, the danger from hot boxes caused by the cinders and ashes falling from fire-box into driving boxes and bearings, causing them to heat.

Practice has shown cast steel to be an inferior metal for driving boxes; it being a stronger metal than cast iron, weight can be reduced in castings, which is about the only merit it possesses. The most serious objection to it is, that it wears badly when in contact with cast iron, as it must be with inside hub of driving-wheel, when, not only the box wears rapidly, but also the hub. Your committee has knowledge of 30 engines with cast-steel driving boxes, on which the hub and boxes had worn in two years so much lateral motion that ½-in. liners had to be fastened to the boxes. These liners were made of cast iron and brass; the cast iron was found to wear well and gave the best results. At the same time these boxes and hubs were wearing, 70 engines built from the same plans with cast iron boxes gave no trouble, and after five years' service had not worn lateral motion enough to need taking up. Another objection to cast steel is, that the metal expands at a low temperature. A bearing becomes hot from some cause, the heat will expand the box more than the brass, which will (if circular shell pressed into box) becomes loose and necessitate tightening up.

Bronze and brass, being alloys of copper, will be treated as one metal. There are but few driving-boxes made of these metals in this country. In Europe it is the rule to use them—they are the best metal for the purpose. Your committee are of the opinion that the coming driving-boxes will be made of these metals, solid, bored out to fit the shaft. The thought of the cost of the bronze or brass over cast iron may at first be startling, but it is likely to prove economical, when it is taken into consideration that the patterns can be made lighter than for cast iron, the slotting out for bearing and fitting saved, the planing, boring and fitting will cost no more than cast iron, and the box will wear until worn through at the top, or so light as to be unsafe, the loss from wear of bearing will be no greater, and there will be a saving of tightening up old and fitting new bearings. When the box is finally worn out, the credit for scrap will make a considerable reduction on cost of new box. The objection might be urged that in case of a hot journal the box might be ruined; extreme cases like this rarely occur. Where bearings had been cut or roughened, it could be re-bored as is now done with separate bearings.

The form of bearing now generally used is the half-round shell, the tendency of these bearings is to become loose, the shape of the bearing and the strain it is subjected to contribute to this end. The weight on the crown of the brass and wear on inside naturally causes the lower ends to close in away from the box and binding on the journal, causing heating and pounding of bearing in box.

The weak point of these half round bearings is the lower edges, which take the pressure in forcing bearing into box; these edges seldom have over three-quarters in. bearing, and it is not unusual to see them not more than ⅜ in.

As the shells are forced to place in the box, with from 20 to 30 tons pressure, it will be readily seen that with this inadequate bearing on the edges, it is impossible to keep shells tight; a width of one and one quarter inches would scarcely be sufficient. They are not made heavier because the driving box is not wide enough to admit of cutting out, it would be weakened too much. After these shell bearings are finally in place we have no confidence in their remaining; we put a couple of ¾ or ⅞ pins through the box and shell to hold in place, further weakening the box with the holes, which in conjunction with the driven pins make a good starting for a fracture. A better shape in every way for journal bearing in driving box is what is known as the hexagon. This form can be fitted into the box without pressure; having no strain on the box it can be made lighter than the shell, and yet have more metal at the bearing points; by casting lugs on the top angles seven-eighths or one inch wide on bearing, and corresponding recesses in the box, it is held to place with no further trouble. The cost of properly fitting this bearing in is no more than the shell bearing, and final result is more satisfactory.

If the half round bearing is to remain as a fitting of locomotive driving boxes, a radical departure will have to be made in increasing width of pedestal openings to admit of wider boxes and heavier bearings which have got of proportion to the heavy engines, larger driving shafts, higher boiler pressure and greater speed of modern practice. Your committee are aware that there are other forms of driving-boxes with brass and cast iron gibs; as there are but few, and those going out of service, have not discussed their merits.

At present the journal bearings of driving boxes are made from bronze and brass. Those who are using bronze speak highly of its merits as a bearing. Those who are using brass are equally sure it is the best metal for the purpose. There are no records to show which of the two metals is actually the best for the service, and gives the best results. There are a number of mixtures for brass of driving-box bearings. Those in use by roads of the largest mileage are as follows: Three, 6 parts of copper to 1 of tin; one, 6 parts of copper to 1 of tin, quarter pound of spelter; one, 7 parts of copper to 1 of tin, adding one-quarter pound lead; two, 7 parts of copper to 1 of tin; all report good results from these bearings. It is generally accepted that good results are obtained from hard bearings; but as the bearing is hardened, the danger of breaking increases; if the bearing is soft, they crush out.

Your committee are of the opinion that no fixed rule can be given for proportion of parts in brasses used in driving shaft bearings for all classes of locomotives. The mixture must be proportioned to the weight carried. Engine truck boxes made of cast iron will answer every purpose. The journal bearings should be made of hexagon pattern fitting freely into the box.

Some good results are obtained by casting the bearing, that no fitting is necessary. The reason of this is, that the weight now carried on engine trucks of the heavy four wheel or American class of locomotive is so great that truck may spring from shocks due to high speed. If shell bearings are used with close fitting boxes, heating is sure to result; when the bearing is loose in the box it will remain on the journal, and not be affected by the spring of the truck frame and braces. The hexagon truck bearing is fastened in box by lugs cast on angle on top side of bearing, which fits into corresponding recess on the inside of truck box. The general practice is to make these bearings of brass; some roads use bronze. The composition where brass is used on roads of large mileage is as follows: One, 7 parts of copper to 1 of tin, and one-quarter pound lead; three, 6 parts of copper to 1 of tin; one, 7 parts of copper to 1 of tin; one 9 parts of copper to 1 of tin; one, 6 parts of copper to 1 of tin, and one-quarter pound of spelter. All report good results from these compositions.

Your committee are of the opinion that the difference in the composition is due to the weight carried; where increased proportion of copper is used the weight is probably light; the copper is reduced as the weight increases; the committee have no information as to these weights. Brass bearings lined with lead give good results when weights are not excessive. It has been found that with 28,000 and 30,000 pounds on truck, the lead will crush out at the ends and sides of bearing; this can be overcome by adding tin or antimony to the lead; when this is done the metal becomes brittle and shells off. In case of hot journal, the lead melts, filling up the oil-holes and cavities, making it impossible to get oil to the journal, resulting trouble and delay. Strips of Babbitt metal one inch wide extending the full length of the bearing give good results, running cool and increasing the life of the bearing.

WM. BUCHANAN,
JNO. W. CLOUD,
J. M. BOON,
} Committee.

DISCUSSION.

Mr. LYNE pointed out the facts that care on the part of the molder was as important a matter as proper proportions of the components of the various metals for brasses and journal bearings.

ALLEN COOKE (Chicago & East Ill.): I think that the round brass with good shoulder at the bottom is the proper fitting and gives better service than any other form of box.

ANGUS SINCLAIR: Those who have tried solid brass and bronze boxes are highly in favor of them. The first cost is more but they are cheaper in the end. The Manhattan Elevated road adopted the bronze box some time ago and is well pleased with it. The expense is less than any other form of box.

Mr. SPRAGUE (Porter Locomotive Works): Cast iron will wear longer and slower than brass, although I think the end play would be greater.

Mr. LAUDER: The lateral wear is less with cast iron than with brass. My experience shows that the plain cast-iron box is the best. There is too much play with brass, and steel will not do at all.

Mr. MACKENZIE: This subject, I believe, also includes lateral motion. In condemning steel driving boxes, this fact should be considered, if the box has lateral motion enough at first there will be less trouble. I have not yet tried steel boxes but it is my intention to give them a trial. I will give them the amount of lateral motion *at first* which they would get with 6 or 8 months' wear, and I think there will be no trouble.

Mr. LAUDER: There is one thing in favor of the old-fashioned driving-box, with three or four gibs—that is, there is no danger of spreading or getting the sides out of parallel. With the box of to day there is great danger of spreading. I have tried solid brasses, and in every instance they have failed on account of heating quickly.

Mr GRIFFITH (D., L. & W.): We have a class of engine hung from bottom of driving box. We have tried cast-iron boxes but found they were not strong enough; have also tried brass but find them too expensive. Composition boxes give less wear on the hubs than cast-iron boxes. The question is of lubrication. If the boxes are well lubricated there will be no trouble with composition boxes.

Mr. J. S. MCCRUM (K. C., F. S. & Gulf): In taking up lateral wear I use babbitt metal. If a box comes in worn laterally I set in some brass pins to hold the face of the box. If I tried steel boxes I would line them with babbitt.

Mr. SPRAGUE: By babbitt I mean cheap metal. Babbitt with copper will wear pins quicker than anything else. Have not for years used high babbitt with copper.

Mr. LYNE: Some people have an idea that babbitt can be cast in a box and obtain good results. This is a mistake. Shrinkage will follow. By babbitt I mean a mixture of 4 lbs. copper, 8 lbs. antimony and 96 lbs. tin. Whenever babbitt is used it should be put in hot, so as to adhere strongly, and form a part of the same casting. The wear of first class babbitt metal is almost imperceptible with good lubrication.

Mr. HICKEY: I think in the so-called old-fashioned box spoken of by Mr. Lauder there were but three gibs. We have inserted five gibs in our brasses, and with engines with 12,500 to 13,000 lbs. on these boxes, they render better service than any other. Good babbitt of high grade is harder than that of low grade, and when properly lubricated nothing will run better.

Mr. NOBLE (H. & T. C.): On our road with five gibs in the box we find the wear on the journal and not on the brass.

A. DOLBEER (Buff., R. & P.): I formerly used a solid half circle box, and when I came on to the B., R. & P. road I found boxes in use with the three gibs. It was my intention then to immortalize myself by using nothing but the solid half circle box, but when engines were taken in for repairs, to my great surprise we had no trouble with the three gib boxes. I became so far converted that I am using this pattern very largely and am changing to cast-iron boxes as rapidly as possible.

Mr. MACKENZIE (N. Y., C. & St. L.): It seems to me the gib box has many friends, but I find that a solid box with the least babbitt gives better wear. I think solid brass properly fitted is the best thing I have ever used.

Mr. MONTGOMERY (Central of N. J.): I have had some experience with hexagon, half-round and gib brasses. In nearly all cases in taking out brasses we found them loose. After receiving some engines from the builders with the three gib boxes we found they gave us less trouble, although the journal wear is more. Have been putting in three gib brasses, and find there is no tendency for them to become loose. We have less trouble in running three gib brasses than any other. The question is if it isn't better to renew axles oftener, thereby obtaining better service from the journal boxes.

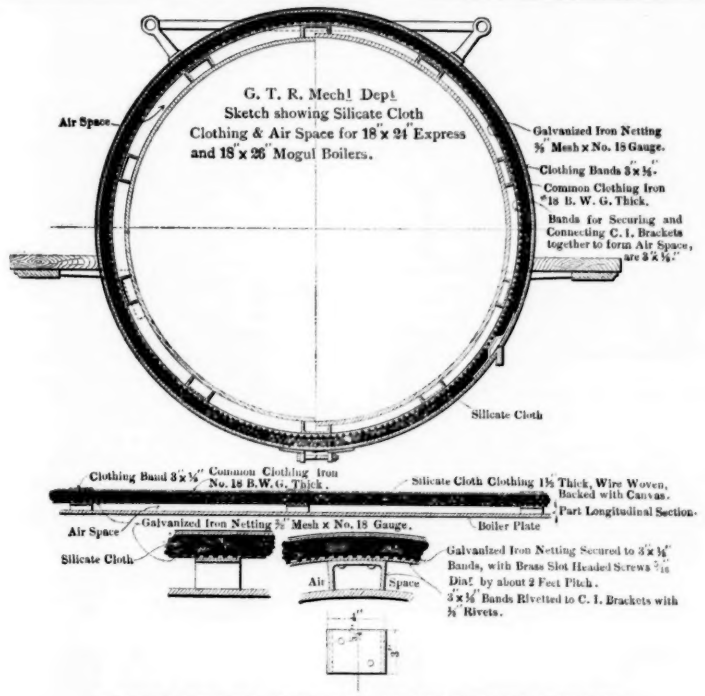
The report of the Committee on Boiler Covering was then read as follows:

BEST BOILER COVERING.

Your committee, intrusted with the subject of report on "best boiler covering," beg leave to submit the following:

In considering the first cost, wood covering is the cheapest, but is comfortable short lived; and, if not kept strictly in repair, rapidly parts with its efficiveness, and, in the end is, undoubtedly a costly covering.

Composite and sectional composite coverings are meeting with considerable favor; the former being applied in a plastic state, and in immediate contact with boiler. This


G. T. R. Mech! Dep!
Sketch showing Silicate Cloth
Clothing & Air Space for 18" x 24" Express
and 18" x 26" Mogul Boilers.
Air Space
Galvanized Iron Netting
½" Mesh x No. 18 Gauge.
Clothing Bands 3/4 x 1/16".
Common Clothing Iron
18 B. W. G. Thick.
Bands for Securing and
Connecting C. I. Brackets
together to form Air Space,
are 3/4 x 1/16".
Silicate Cloth
Clothing Band 3/4 x 1/16" Common Clothing Iron
No. 18 B.W.G. Thick.
Silicate Cloth Clothing 1½ Thick, Wire Woven,
Backed with Canvas.
Part Longitudinal Section.
Air Space
Galvanized Iron Netting ½" Mesh x No. 18 Gauge.
Boiler Plate
Silicate Cloth
Galvanized Iron Netting Secured to 3/4 x 1/16"
Bands, with Brass Slot Headed Screws ½ in
Diaf. by about 2 Feet Pitch.
Air Space
3/4 x 1/16" Bands Rivetted to C. I. Brackets with
1/2" Rivets.
4"

SILICATE BOILER COVERING—GRAND TRUNK RAILWAY.

method provides no air space, and is questionable as to producing the best results with covering of any kind.

With whatever covering used, it is always in the interest of economy to first apply to the boiler a coating of non-conducting non-corrosive material; for which plaster of paris appears to be well suited; the application being made by mixing with water and applied with a brush; and, in consequence of its rapid drying qualities, several coats can be quickly applied.

The subjoined table, taken from the *Railroad Gazette* of April 20, 1887 (Experiments on Loss of Heat by Radiation, by Mr. J. C. Hoadley, of Lawrence, Mass.), gives unmistakable evidence of the economy in covering boilers:

1	2	3	4	5	6	7
Pressures by steam gauge, pounds per sq. in.	Computed time in minutes of increase in pressure.	Observed time in minutes of increase in pressure.	Loss of pressure by radiation from naked boiler in minutes.	Percentage of loss with naked boiler.	Loss of pressure by radiation from clothed boiler, minutes.	Percentage of losses with clothed boiler.
0 to 10	5.0	7.5	....	....	....	....
10 to 20	3.5	4.3	....	....	....	....
20 to 30	2.8	3.3	....	....	....	....
30 to 40	2.3	2.5	....	....	....	....
40 to 50	2.0	2.1	....	....	....	....
50 to 60	1.8	1.9	18.0	10.6	41.1	4.6
60 to 70	1.6	1.8	15.0	11.3	37.5	4.5
70 to 80	1.5	1.4	13.7	10.2	32.5	4.3
80 to 90	1.3	1.3	12.1	10.7	29.9	4.3
90 to 100	1.2	1.2	10.9	11.0	24.3	4.9
100 to 110	1.2	1.2	9.4	12.8	21.0	5.7
110 to 120	1.1	1.1	8.5	12.8	19.2	5.7
120 to 130	1.0	1.0	7.6	13.2	18.8	5.3
130 to 140	1.0	1.0	7.3	13.7	17 3	5.8
Mean.	....	....	....	11.8	....	5.0

The following extracts from the *Railroad Gazette* editorial commenting on the experiments are of value, on account of their pertinency to the subject in hand. [We do not reprint the extract.]

To your committee, an ideal covering is one that admits of ready application and removal; reduces radiation to a minimum; has durable qualities; is not injurious to metal plates, and is of sufficient stability for retention of symmetrical form of outside covering or jacket, for which Russia or planished iron has been generally adopted, and, for the purpose, is unexcelled, being durable, readily manipulated, and having a surface that pleases the eye, and strictly in accordance with the teaching of philosophy that good reflectors of heat are poor radiators; thereby beauty and utility are combined and emphasize the wisdom in selecting such material for the purpose required.

Your committee concludes that it is inexpedient, at this time, to recommend a definite method and material for boiler covering, but recognize that there is a growing tendency for a more durable and effective material than wood, and urge that the economy in covering a portion of the boiler will be augmented by covering the remaining portion, which, as a rule, amounts to about 25 per cent. of the entire radiating surface.

G. W. STEVENS,
JOHN MACKENZIE,
T. B. TWOMBLY.

DISCUSSION.

Mr. MACKENZIE: Is it advantageous to have an air space between the boiler covering and shell? And if so, is it of advantage to leave it open at the bottom of the boiler? I have seen this tried but not satisfactory.

Mr. L. S. GRAHAM (Lake Shore & M. S.): I cannot give any results as yet, as we are only experimenting and I have no figures. We use asbestos next to the shell, then hair felt, and thimbles to hold the sheet out. We leave no air space. The shell is covered with wood, also the boiler head.

Mr. LAUDER uses a thin sheet of asbestos and wood lagging. The lagging is kept from charring and lasts longer.

Mr. GEORGE GIBBS thinks hair felt the best boiler covering.

Mr. GRIFFITH (D., L. & W.) is using asbestos with good results.

Mr. STEWART (Fitchburg): The Fitchburg has used asbestos on locomotives 16 years, and it is now as good as when first put on. Wood lagging will last but about four years, and is of little use after the first year, as the shrinkage and charring have opened joints and spoiled it as a non-conductor. The difference in first cost is more than made up by better service of asbestos.

Mr. J. DAVIS BARNETT (Grand Trunk) uses silicate cloth, as being a better non-conductor than asbestos, indestructible and not easily adulterated. He puts on rings of angle iron to leave an air space of one inch, covers these with wire netting, puts about one inch of silicate cloth over the netting, and covers all with Russia iron. He could not give the cost of this covering, but it is an excellent one. [See cut with the report.]

Mr. CHAS. BLACKWELL recommends a careful chemical examination of asbestos before using it, as some of it is badly adulterated and will corrode the iron next it seriously.

The report of the Committee on Driver Brakes was then read:

REPORT OF COMMITTEE ON DRIVER-BRAKES.

The use of this device has within the past two or three years increased in a very marked degree, evidently accompanying the recent increment in weight and speed of both passenger and freight trains. The still more general use of the driver-brake appears probable and will, doubtless, result in the safer operating of our railroads.

The Westinghouse Co. report that up to the present time they have furnished about 7,500 sets of driver-brakes of their type, and that the American Brake Co. has supplied about 3,800 sets of their style of brake. The Eames Vacuum Brake Co. state that their driver brake is in use on 364 different railways, but do not give the number of sets. Air, steam and vacuum are all undergoing extended trial as motive power for the operation of the brakes.

Some master mechanics consider it better, in view of possible failure of the power operating the train brake, and which, on account of its most general adoption, may be considered compressed air, to use either steam or vacuum for applying the driver-brake. This should be arranged without an additional handle for engineer, for as your committee are of opinion that the driver-brake should, as a rule, be used in conjunction with train-brake, on both passenger and freight engines, the additional handle would cause confusion.

The following statement received from the Chicago, Burlington & Quincy, showing the marked improvement made in the arresting power of driver-brakes on that road, illustrates what can be done by intelligent investigation, and improvements in details thereby indicated. The results of the Westinghouse brake in 1886 were obtained with the "spread" style of brake, while those in 1887 were with the "clasp" brake, which style your committee recommend in all cases where its application is possible.

Best stops with driver brakes at Burlington, brake tests, 1886, 1887, 8 wheeled passenger engines, 54,000 lbs. on drivers, weight of engine, tender and way-car, 168,000 lbs., 63 per cent. of this braked:

	1886. Stops in feet on level.		1887. Stops in feet on level.	
	20	40	20	40
	m. p. h.	m. p. h.	m. p. h.	m. p. h.
American (steam)	203	853	...	...
Westinghouse	352	1,457	194	914
Eames	272	1,002	279	1,058
Carpenter	...	....	167	692

showing improvement in the case of the Westinghouse brake between 1886 and 1887 of 45 per cent.

Consolidation engine, with pump-brake, and shoes on all drivers, on level:

	1887. Stops in feet.	
	20 m. h. p.	40 m. p. h.
American (steam)	330	763
C., B. & Q. (air)	254	904

When driver-brakes are used for making all stops, each wheel should be braked, or unequal wear of tires and consequent difference in diameter will result, especially where the ordinary narrow shoe is employed; hence your committee advise the application of brakes to each driving wheel.

Experiments are now being extensively tried in order to determine the best material or combination of materials, and also the best form, for driver-brake-shoes. Your committee unhesitatingly recommend the principle of the Ross shoe, but are not prepared to state conclusively, until more exhaustive trials have been made, if the cast-steel, the Meehan, the Lappin, or the Congdon make of the Ross shoe will, all things considered, give the best results. The steel shoe, while possessing great endurance, is charged with excessive wear of the tires; but this feature may be overcome by modification in the composition and treatment of the metal.

The excellent tire-dressing results obtained by the "Ross-Meehan" shoes, and as shown on blue prints accompanying this paper, are worthy of attention.

Your committee regret that they have been unable to obtain information which would enable them to illustrate the comparative wear, under similar conditions, of the various makes of brake-shoes above referred to, and of the tires to which they were applied. In some cases the Ross steel and the Ross-Meehan shoes are reported as out-wearing eight to ten ordinary cast-iron shoes of similar pattern; and in other cases as increasing the mileage of the tires, between the turnings, from 200 to 500 per cent., as compared with the old style of shoe, bearing on the tread of wheel only. These advantages are obvious, and when more generally understood will tend to break down prejudice against the use of driver brakes, and consequently to increase the proportion of engines so equipped.

Your committee feels compelled to point out the unfortunate existence of an excessive number of different patterns of brake heads and shoes now in general use. Where clearance between wheels is limited, special forms of heads and shoes are necessary, but these special patterns, as well as those used where plenty of room exists, should be reduced to a minimum, and care taken to make those of a kind thoroughly interchangeable.

As regards the most desirable ratio between brake-shoe pressure and weight on rail, your committee recommend for the Ross pattern of shoe, and clasp-brake, from 30 to 35 per cent.

The pressure per square inch sustained by brake-shoes varies in different designs that have come to the notice of your committee, from 50 to nearly 200 lbs. Until more is known on this point, they refrain from recommending limits within which best results may be expected.

The LeChatelier, or water brake, is practically a driver-brake, and as a device for holding engines on heavy grades, appears to be too little known.

Mr. N. W. Sample, Superintendent M. P., of the Denver & Rio Grande, reports as regards this brake:

"We never pretended to use it for the purpose of retarding trains, as we have had all our cars and engine-tenders equipped with air brakes since 1877. For the purpose of holding light engines on heavy grades, where the tank brake is not sufficient, there is certainly nothing so good as LeChatelier's device. We use it on our locomotives daily on grades from 100 to 408 ft. per mile. We have no driver brake shoes. We discarded all brakes that apply directly to the face of the driving wheels eight years ago. In my opinion, the very best driver brake is LeChatelier's device."

The following communication was received from Messrs. Rhodes and Forsythe, of the Chicago, Burlington & Quincy:

"There is a great difference in the efficiency of driver-brakes, not only between different systems, but on different engines with the same system, depending largely upon the manner in which the brakes are fitted up.

"The Master Mechanics' Association could establish a standard of excellence, expressed in the number of feet on a level in which an engine (with tank loaded to weigh an even 50,000 lbs.) could stop itself at speeds of say 20, 40 and 60 miles per hour.

"Any master mechanic could easily make a list of the driver brakes of his engines, and by comparing the results with figures presented by the association as showing a high efficiency, he could tell at once how well or how badly his driver brakes were working, and thus having a measure of their efficiency, would better appreciate the necessary improvement. We regard this as the most valuable work the Master Mechanics' Association could do on the subject of driver-brakes."

This letter came to hand at too late a date to enable your committee to take any action in the direction named, but it is to be hoped that within the next 12 months some of the members will be induced to experiment with a view of obtaining data that will be useful in establishing standards of efficiency, as suggested by Messrs. Rhodes and Forsyth.

CHARLES BLACKWELL,
H. D. GORDON,
W. H. THOMAS,
Committee.

In the discussion of this report several members objected to the use of one handle for the application of both the train and the driver brakes. It was argued that the driving tires were needlessly worn by using the driver brake in all stops, and that it was desirable to have a reserve for emergencies. The weight of opinion was, however, in favor of regular use of the driver brakes and one handle.

The use of the Ross form of shoe was very generally spoken of as highly advantageous. Mr. Mackenzie mentioned engines hauling 42 car-trains on 70 ft. grades and running 25,000 miles to 1/16 in. wear. These have the Ross steel brake shoe. And Mr. Swanson told of an engine making 168,000 miles without turning, or 20,000 per 1/8 wear.

The next report was that of the Committee on Foundation Ring for Boiler Leg, as follows:

FOUNDATION RING FOR BOILER LEG.

In considering the question of the best method of joining the furnace-plates with the shell plates at the bottom of the boiler leg of a locomotive boiler, the matter of first cost should be taken as a minor consideration; the obtaining of a joint that shall be durable and perfect being the all-important object, and this, when found and adopted, will, in the end, prove most economical.

The almost universal practice in this country has been to use a plain rectangular bar of iron, with depth enough to take one of 3/4-in. rivets. The only merit this system possesses in its cheapness in first cost, and many unscrupulous builders bend the corners without upsetting the bar, and, in consequence, the ring at the corners is so reduced in thickness vertically that it will hardly hold water when new, and when put in service the strains of unequal expansion will very soon produce leaks. Until recently there seems to have been very little effort made to correct this evil, but we have gone on apparently with the idea that this defect was inherent in the locomotive of boiler, and could not be remedied.

In Europe a variety of methods of construction have been tried with varying degrees of success. A plan, shown in fig. 1, was furnished your committee by Mr. Webb, of the London & Northwestern Railway. An examination of this plan will show that the outside plate at the corners is double riveted while the inside furnace-plate is fastened with a single row of rivets in the usual manner. Our experience and observation based on practice in this country, would lead us to condemn this method, as the joints of the inside plates at the corners are those that give the greatest trouble from leaking; but the difference in practice may

be accounted for by the fact that Mr. Webb uses copper for his furnaces, while in this country steel is used. Another method, shown in fig. 2, is used as a standard by the Canadian Pacific Railway, and to a limited extent by several roads in the United States, notably the New York, Chicago & St. Louis, and it doubtless possesses merit as far as the corners are concerned. But the remainder of the ring is simply the plain, single-riveted foundation ring, and is sure to develop leaks at other points than the corners, especially when the quality of the water used is poor.

The system of construction of locomotive boilers wherein the furnace of the boiler is placed over the frame, is rapidly coming into use, and the foundation ring construction just mentioned would be with this system an annoyance Placing the furnace over the frame increases the necessity for thorough construction of the bottom of the furnace, as leaks at that point, especially at the corners, are difficult to repair without raising the boiler from the frame, which entails a heavy expense.

Efforts are also being made to improve the ordinary method by making the ring deep enough to receive the two rows of rivets through it all round. This method, shown in fig. 3, your committee believe to be the best yet used, as it makes a strong and thorough mechanical job, and if the ring at the corners is properly prepared and the riveting well done, will never leak. Much depends on having the ring well prepared to receive the plates, and your committee believe that the expense of machining the ring around the corners, both outside and inside, will prove an excellent investment. Poor workmanship, with any design of foundation ring, will give trouble; and in drawing specifications great care should be taken to bind the builders very closely in the design, and the workmanship should be carefully inspected as the work of building progresses.

In conclusion, your committee would recommend a double riveted foundation ring, substantially as shown in drawing No. 4.

J. N. LAUDER,
W. J. ROBERTSON,
H. TANDY,
} Committee.

This report was not discussed on Wednesday.

Messrs. Meehan, Lauder and Hickey were appointed a committee on next place of meeting.

Messrs. George Richards and John Thompson were placed on the list of honorary members by unanimous vote.

On Wednesday afternoon the members and their friends were the guests of the Rotary Steam Snow Shovel Co. on an excursion by steamer on Lake Ontario.

Tuesday evening a fine instrumental and vocal concert was given in the parlors of the International Hotel.

WATER SPACE SURROUNDING FIRE-BOX AND FLUES OF LOCOMOTIVES.

Your committee issued a circular containing 11 questions. Only 14 replies were received, viz.:

From J. N. Lauder, Old Colony Railroad (A); W. A. Foster, Fall Brook Coal Co. (B); Francis R. F. Brown, Canadian Pacific (C); Matt Ellis, Chicago, St. Paul, Minneapolis & Omaha (D); W. C. Arp, Chicago, St. Louis & Pittsburgh (E); Wm. Garstang, Chesapeake & Ohio (F); F. F. Tynan, of Cuba (G); Z. J. Ferguson, Mobile & Ohio (H); Allen Cooke, Chicago & Eastern Illinois (I); George W. Stevens, Lake Shore & Michigan Southern (J); G. W. Rhodes, Chicago, Burlington & Quincy (K); T. W. Gentry, Richmond & Danville (L); F. Slater, Milwaukee, Lake Shore & Western (M), and J. S. McCrum, Kansas City, Fort Scott & Memphis (N).

While many of the questions have been answered with the monosyllables "Yes" and "No," the majority have been replied to fully and earnestly, several members warmly discussing the subject in a general way, and all admitting the importance of the subject in hand.

Summarizing the answers as impartially as may be, your committee find there is almost an unanimous sentiment in favor of enlarging the water space between the inner and outer sheets of a locomotive fire-box. This feeling also prevails regarding the clearance space between the boiler tubes. It is generally admitted that where the feed-water is largely or even moderately charged with foreign matter, the water space on the back and sides of the fire-box should not be less than 4½ in., with a distance of not less than 5 in. between the front sheets of box, while a few advocate a water space surrounding fire-box of 5 in.

The ordinary American type of locomotive boiler with deep fire-box has usually been given but 3 in. water space between the side and back sheets. When replacing fire-boxes many have increased this to 4 and 4½ in., and have obtained therefrom the most satisfactory results, both as to durability of fire sheets and augmented evaporation.

On this point Mr. Stevens, of the Lake Shore & Michigan Southern, writes: "It is our practice for engines in heavy express train service to use a water space around fire-box of 4 in. For such engines having extreme depth of fire-box we believe this space is preferable to that of less width, as it permits a more free circulation of water, prolongs the life of the fire-box, and is conducive to free steaming. We, of course, recognize a loss of grate surface, but prefer this to a more restricted circulation." The same authority states: "Some years ago experiments were made on several of our express engines to ascertain if water in leg of fire-box at side sheets was in contact with said sheets when engine was working. The manner of determining this was by screwing a cock through outside sheet and allowing it to project into water space up to within about ⅛ in. of inside sheet of fire-box, a rod and handle reached to cab for the purpose of controlling this valve when the engine was in motion. It was found that all times very little water would come from the cock, and, as a rule, when engine was working the discharge would be what is termed by engineers as seen from the gauge cocks as 'steam and water,' usually more of the former than of the latter."

The information received by your committee, particularly from locations where the feed water contains scale-producing elements, leads them to believe that the general feeling is there should be a clearance space of ¾ in. between 2 in. tubes in locomotive boilers, and that the spaces between should be in straight line vertically, the latter condition offering not only less hindrance to the circulation, but be a great aid in precipitating the deposited matter.

Mr. McCrum, of the Kansas City, Fort Scott & Memphis, on this point writes: "I appreciate the advantages of a large heating surface, but as regards increased flue heating surface I am confident it is often obtained at the sacrifice of water space; comparative performances of boilers on this road with a greater and lesser number of tubes proving this."

The several expressions smack strongly of doing away with the old style crown bars and replacing that method of staying with some system offering less resistance to the circulation

Mr. Francis R. F. Brown, of the Canadian Pacific, sends a blue print (see *Railroad Gazette*, May 31, 1889), showing construction of boiler used on that road, concerning which he writes: "I do not think I can answer the various questions any better than by referring you to this drawing; it is our standard mogul engine boiler, forty of which we have in service on this road. The boiler is designed to carry 180 lbs. of steam and I experience no trouble from any of them. I prefer the arrangement of tubes as shown on the drawing, on account of less liability of the boiler mudding up. As to the arrangement of crown bars, I have found the combination, as shown on the drawings, to work satisfactorily, having had several years experience with them."

Your committee regret not having sufficient information at hand from which to compile a report based on comparative results, and the committee not having had time or opportunity to make the necessary tests feel that any further recount of the subject must be largely suggestive.

The serviceable period of a locomotive is dependent largely on the duration of its boiler. The limit of power is determined by the boiler; the generating power, the safety and the duration of a boiler, mainly depend on the facilities offered the water for reaching and remaining in contact with the heated surface. The efficiency of the heating surface is measured by the amount and frequency of the water in contact with it, therefore any effort tending to promote the freedom of, or hasten the action of, the water towards the heating surface, or in any way encouraging its presence at the heated sheets, is one towards increasing the power, the efficiency and the duration of a locomotive.

The evaporation per pound of coal used, in a large majority of locomotive boilers, is far less than should reasonably be expected. This is undoubtedly owing in part to an insufficient supply of water in proximity to the fire sheets, caused by the narrow water spaces surrounding the fire-boxes, together with the flues being set so closely together that the circulation of water among them is greatly impeded, thus reducing the efficiency of the heating surface. These conditions are further aggravated by the scale deposit on the

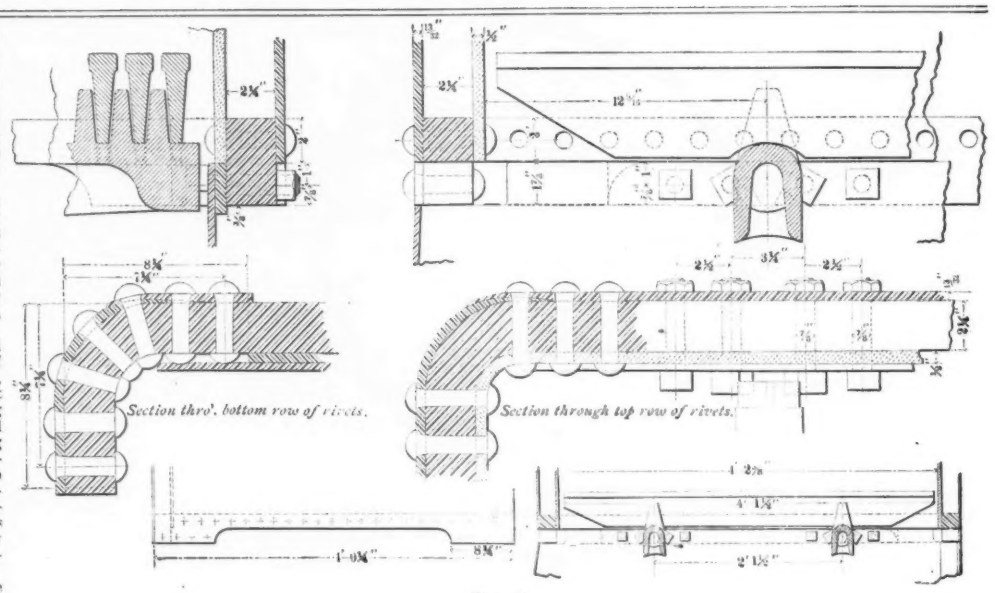


Fig. 1.

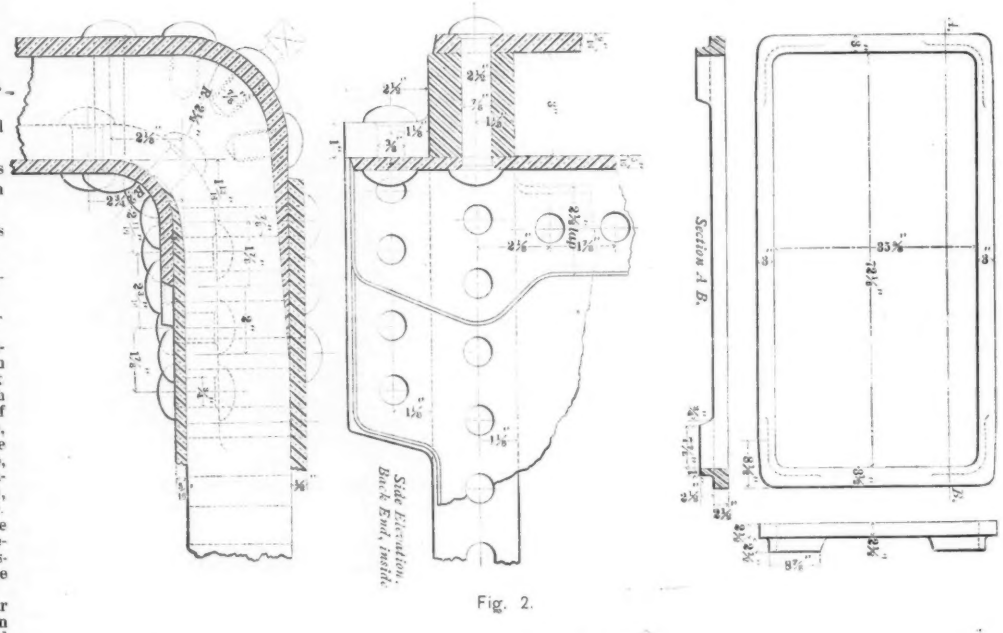


Fig. 2.

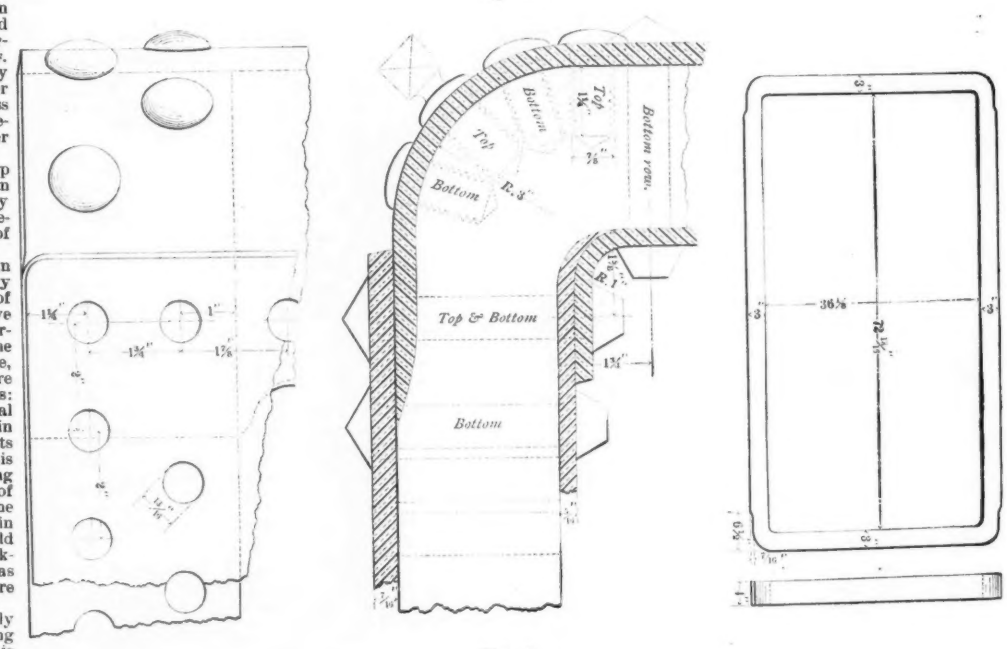


Fig. 3.

FOUNDATION RING FOR BOILER LEG.

WITH REPORT OF MASTER MECHANICS' COMMITTEE.

transmitting surface, and this, with the usual cumbrous manner of staying the crown sheet, hindering in consequence the circulation, thus impairing the efficiency of this sheet as a heat transmitter.

The results of improper circulation of water in a boiler are not confined to the loss of a reduced evaporation for a given amount of fuel used; to this is due the rapid deterioration of the fire-box plates caused by overheating, the pernicious effects of which are scarcely realized. When plates are overheated, the unequal expansion of the inner and outer sheets strain them to such an extent that frequent renewal of stay bolts becomes necessary; there is also danger that overheating may cause an expansion of the metal to a point in excess of its elastic limit, in which case a permanent set must occur, and the metal is in precisely the same condition as though the limit of elasticity had been exceeded by overstrain.

May not in some cases, also, the heat in our fire-boxes be too high to produce steam? In our early years we were taught that steam was a perfect non-conductor of heat, and for illustration the rolling of a drop of water across the surface of a hot stove was cited; by way of explanation we were told that the drop rested on a thin cushion of steam through which the heat could not penetrate, so that the water was not warmed. Cannot this same thing take place, only on a larger scale, in a boiler where the circulation is impeded?

The panacea for the evils enumerated is, plainly, larger water space and a thorough circulation of the water within the boiler, the principles of which are well known. To obtain this, however, that it may reach the full measure of requirements, is a question not so easily solved. That such is necessary in order to obtain the full heating value of the fuel used, is indisputable, and to reach that point will require more attention than has heretofore been given it, is also certain.

When we depend on the specific gravity of water to bring about a circulation necessary to absorb the heat generated in a locomotive fire-box, large and unrestricted passages for its operation are essentially necessary. It is but waste to produce heat unless we have the means at hand to absorb it. In order to get any work or usefulness from heat it is necessary to have a hotter body and a colder one; it is, therefore, as necessary to produce the colder body as that the hotter one be generated.

Another point which involves a common mistake is the attempt to increase the amount of heating surface by putting in more tubes; this will not necessarily increase the steaming capacity: indeed, the reverse may take place, the crowded condition of the tubes retarding the circulation. The number of tubes on many locomotives can be reduced from 10 to 20 per cent. with decided advantage. It is true that this will reduce the heating surface, but in very many cases the increased efficiency of those remaining will more than compensate for the loss in number.

Heating surface in the abstract is one thing, its capacity for transmitting heat is another. With a circulation not too restricted undoubtedly the most important part of the heating surface are the fire-box sheets; this may include 12 in. of tube surface nearest the fire-box. A flat, horizontal surface, situated as the crown-sheet above the fire, or one at that point concave to the fire, is best adapted for receiving and transmitting heat, and from its situation in the boiler must facilitate the access of fresh supplies of water to replace the heated ascending particles, hence the necessity of freeing the crown-sheet of every possible attachment that might interfere with the free movement of water.

A surface sloping towards the fire is next in efficiency for transmitting heat; if it is proposed to enlarge the water-ways surrounding the fire-box, the space bordering the foundation ring need not, perhaps, be increased, as the water at that point receives but little heat. A tapering enlargement of the space in a vertical direction may be accomplished by sloping inwardly the side sheets of the furnace, thus increasing the heat imparting power of the surface, without perceptibly diminishing the efficiency of the combustion chamber; the sloping sides not only receive the rays of heat at a more favorable angle for transmission, but, on the water-side, the heated particles have less difficulty in disengaging from the surface than if the sheets were strictly vertical.

The evaporative efficiency of a boiler depends, no doubt, to some extent on the nature and thickness of material forming the heating surface. Carefully conducted experiments, some years since, however, and the results later of actual practice, show that, after the first few days of work with ordinary impure feed water, there is no perceptible difference in the evaporative power of copper, brass and iron tubes, although their relative conducting power, when clean, are, respectively, 74, 24, 12, and that, so far as the economical use of fuel is concerned, there is no gain in using the highest priced metal: it is remembered that the same result was found when using slightly different thicknesses. The difference between the steaming power of new boilers with furnace plates $\frac{5}{8}$ and $\frac{5}{16}$ in. thick was found to be materially in favor of the thin sheets; but it is asserted that this difference disappeared as the plates became coated with incrustation. It is a fact well known that furnace plates having a thickness of $\frac{5}{8}$ and $\frac{7}{16}$ in. are more liable to fracture than $\frac{5}{16}$-in. plate, and this argument is at times used to prove the inferior evaporating power of thick plates; this, however, does not necessarily follow; the injury to thick plates is mostly caused by unequal expansion, this evil being directly proportional to its thickness. Considering the speed of the heated currents in a locomotive fire-box and the short time allowed for transmission, a homogeneous plate of absolutely uniform thickness, and about $\frac{5}{16}$-in. thick, practically appears to be best adapted to perform all duties required of the sides and back plates of a furnace.

Your committee have observed cases where a portion of the tube surface nearest the fire-box has been replaced by combustion chambers, reducing proportionately the area of water space of the boiler, and presenting a less amount of transmitting surface for the flame, but allowing a better mixture of the gases and a more perfect combustion, yet a loss of evaporative power, or at least no perceptible gain of the latter could be observed, showing that changes of this kind should be made with great care, and reminding one of the necessity of keeping constantly in mind that the correction of one evil may lead to the cause of another.

Your committee cannot urge too strongly the necessity and importance of admitting the feed water regularly, and at the same time entering with an equal flow at points on opposite sides of the boilers. The inlet volume of the feed water is by this means divided, resulting in less variation of boiler temperature, effecting a more uniform expansion, and assisting largely the circulating action of the water.

It has come to the notice of your committee that mechanical means have been introduced for the purpose of enforcing a rapid circulation and equalization of water in a locomotive boiler. The principal features of the device, however, or what results have been obtained from its use, we have been unable to ascertain. Movements in this direction are worthy of the most serious consideration, and it is hoped that members knowing anything of such a contrivance, will state the matter before the convention.

It is desired, in conclusion, to say that, owing to circumstances beyond their control, the report does not contain as much information on the essential points of the subject as the committee intended. We entertain high hopes, however, that the suggestions herein will enable a future committee to promptly prepare and carefully make some experiments, which shall lead to early and valuable conclusions.

JOHN HICKEY,
J. N. BARR,
R. W. BUSHNELL, } Committee.

BEST PROPORTION OF GRATE AND FLUE AREA.

The subject assigned your committee is one requiring extensive experiment if satisfactory conclusions are to be arrived at. Its members had not the leisure, much less the means, to carry out such experiments; in fact, a grant from the National Treasury would be required to cover so heavy an outlay. But it was very naturally supposed that some of our association members might have tried individual experiments by varying a normal type of boiler at some single point, and noting the effect of the variation. With this hope your committee issued a Circular of Inquiry. A summary of the few replies received is as follows:

Tube (Heating Surface) Area.—Two have varied the tubes in boilers of similar size, viz., Mr. H. Schlacks, who added ten more tubes, improving its steaming qualities, but as the crown-sheet and tube-sheet were widened to get these tubes in, it cannot definitely be said to which of these changes the improvement is due; and Mr. G. W. Stevens, who, on a 17 in. × 24 in. × 5 ft. passenger engine, changed the boiler from 147 flues, 2¼ in. diameter, to 212 of 1¾ in. diameter, the length, 11 ft. 6 in., remaining unaltered. This increased the external flue surface from 995 ft. to 1,116 ft., or 121 ft. —equal to 12 per cent.—with an increased water evaporation of practically 7½ per cent., and after two years' experience he is able to report that the smaller size flues are not any more troublesome in the matter of stopping up than the larger flues, and also that they are less disposed to leak.

Mr. F. B. Twombley has in hand an experiment which, it is hoped, will be so far advanced in June that he will be able to give a personal report.

Grate Surface.—Our queries in this matter were framed with the purpose of finding out the modifying effect of altering the amount of grate surface.

Mr. H. Schlacks reports lengthening grates (and furnaces) from 60 in. to 66 in., keeping every other point unchanged, but he cannot note any appreciable difference in their efficiencies, and thinks it is possible to give a boiler too large a grate surface.

Mr. Wm. Garstang has 58-in. boilers, with 72-in. and 78-in. lengths of grates. Those with the longest grates are the freest steamers, but the coal consumption is about the same. However, any conclusions to be drawn from this example has to be modified by the knowledge that the longer grate has the fewer flues by 9 per cent., although they are spaced wider apart by 20 per cent. The figures are: For the short grate, 244 flues spaced ⅝ in. apart, and for long fire-box, 221 spaced ⅝ in. apart.

On the general question of grate surface he thinks it is possible to get too large a surface if the coal is good.

Mr. O'Stewart reports reducing Baldwin consolidation grates and furnaces from 120 in. to 96 in., and using a 16-in. dead-plate in front, so that the effective grate is but 80 in. long. This experiment was so satisfactory that the whole class now have their grates reduced to these figures.

On the general question of grate-surface, four others say it is not possible to give too large a surface (under the limiting conditions).

No one has experimented in the direction of reducing medium or short grates, with the hope of making cumbustion more rapid and thus attaining a more economical result, as, for instance, has been done in exceptional cases with some stationary and portable boilers, to their evident improvement. In exhibition contests with portable engines, reducing grate area is a favorite means of jockeying used by some wide-awake competitors.

Querry No. 6 has been variously understood and interpreted. Mr. W. A. Foster under all circumstances would make the grate surface as large as possible independent of heating surface. Mr. Garstang gives 90 ft. of surface to one grate, and Mr. Schlacks from 60–65 to 1. Mr. Barnes would give a gas opening through flues as compared with grate of 3 to 1 for 17-in. cylindered engines.

Dead Plates.—The question about dead plates was not generally understood, as it was commonly remarked in the replies that dead plates are put in front end of grates usually to prevent the strong blast from drawing in too much air close to flue sheet. However, Mr. Schlacks reports taking the dead plates out at back end of grate and improving the steaming, the air spaces between bars remaining unaltered; and Mr. M. Ellis removed dead plate and changed the bars, giving 56 square in. air opening per square foot of grate, instead of 47, with satisfactory results.

Evaporation.—Mr. Allen Cooke gets from 7 to 9 lbs. of water, Mr. Schlacks from 5½ to 6, and Mr. Ellis' best record is 8.54 from and at a temperature of 65 deg. Fahr.

In conclusion we would say that the small amount of information obtainable from the association provoked your committee to look elsewhere, and two of its members make personal contributions as per appendixes A and B, attached.

J. DAVIS BARNETT,
F. W. DEAN,
PHILIP WALLIS.

With this report are two appendices. One is a summary, by Mr. J. Davis Barnett, of the investigations and analysis of Paul Harvey, D. K. Clarke, J. A. Longridge and O. Busse, bearing on the subject of the report. The other is a paper by Mr. F. W. Dean, on Design of Locomotive Boilers. These will both be published, by abstract at least, in a later issue of the *Railroad Gazette*.

EXHIBITS.

The following is a list of the exhibits shown by the various houses represented:

The A. French Spring Co., Ltd., Pittsburgh, Pa.—The Morris steel box covers adapted to various styles of boxes; made of rolled steel, pressed and of cast, spring steel; also, several springs.

The Ross Valve Co., Troy, N. Y.—Ross reducing valves.

Wm. G. Robinson, 66 Broadway, New York—The security railroad chuck.

The Detroit Lubricator Co., Detroit, Mich.—The Garfield injector, sight feed lubricator and oil-cups for locomotive rods and guides.

B. E. Tilden & Co., Cleveland, O.—Car and locomotive replacing frogs.

Leland's Universal Car Heating and Coupling Co., 89 Centre street, New York—A steam coupler and a muffler for heating water by live steam.

Hale & Kilburn, Philadelphia, Pa.—Several seats, also arrangements of springs for seats.

Anti-Friction Metal Co., North East, Pa.—Specimens of tempered copper journal brasses, etc.

The Erie Car Heating Co., Erie, Pa., and Chicago.—Joints, couplings and steam trap for car heating.

The Gold Car Heating Co., Cliff and Frankfort streets, New York.—Coupler and "Excelsior" steam trap.

The Buffalo Steam Pump Co., Buffalo, N. Y.—Photographs and blue prints of pumps and fittings.

J. M. Foster & Co., 81 Fulton street, New York.—Foster's automatic pressure regulator for steam, water, gas or air.

Schoen Manufacturing Co., 55 and 57 Laurel street, Philadelphia, Pa.—Pressed steel centre plates and stake pockets.

D. E. McSherry & Co., Dayton, O.—The Maxon patent jack in various styles and sizes.

The Chalmers Spence Co., 8th St. and East River, New York City.—Samples of asbestos "fire-felt" pipe coverings and boiler lagging.

The Williames Car Heating Co., Boston, Mass.—Steam heating coupler.

Mason Regulator Co., 10 Central St., Boston, Mass.—Reducing valve, pump pressure regulator and combined steam trap reducing valve.

H. W. Johns Manufacturing Co., 87 Maiden Lane, New York.—Various asbestos materials and indurated fibre pipe for insulation, etc.

Fairbanks & Co., New York.—Various steam specialties, as asbestos globe valves, cocks, etc.

Shields & Brown Co., Chicago, and 143 Worth street, New York.—Sectional insulated air coverings.

The Union Manufacturing Co., New Britain, Conn.—The Skinner combination lathe chuck.

The Damascus Bronze Co., Limited, Pittsburgh, Pa.—Journal bearings.

E. P. Shaffer, Rochester, N. Y.—Oil cups.

C. F. Hall & Son, Skaneateles, N. Y.—Valve refitting machinery.

J. J. McCabe, 121 Liberty St., New York.—Halsey's portable power drill.

Otley Manufacturing Co., Chicago, Ill.—Steam packing cement.

Kalamazoo Railroad Velocipede Car Co., Kalamazoo, Mich.—Standard section cars, one 6 ft. 4 in. and one 7 ft. 6 in. long, natural wood, oak.

The A. J. Hartford Steel Railway Tie Mfg. Co., Temple Court, New York City.—Model of the Hartford steel tie.

The Northwestern Modern Car Heating & Lighting Co., St. Paul, Minn.—Steam coupling joint and trap.

Gould-Tisdale Revolving Semaphore Co., 620 Atlantic Ave., Boston, Mass.—Model of electric semaphore.

The Asbestos Packing Co., 169 Congress street, Boston, Mass.—Removable coverings for steam or water pipes for car heating.

Eames Vacuum Brake Co., New York.—Blue prints and model of equalized driver brakes.

Porter & Grosvenor, Detroit, Mich.—Automatic coupling for air brake hose designed to take the place of the cock, and to render it impossible to couple air brake hose without opening communication through train pipe.

New York Car Wheel Co., Buffalo, N. Y.—A machined, cast iron wheel, showing balance of wheel.

The Standard Car Heating and Ventilating Co., Pittsburgh, Pa.—Full size model of various parts of the return system of heating controlled by the company with trap and coupling. Also blue print of system of heating by hot air circulation.

The Jull Manufacturing Co., Brooklyn, N. Y.—Model of the Jull centrifugal snow plow.

The Buffalo Steel Foundry Co., Buffalo, N. Y.—Section of cast steel wheel.

The Martin Anti-Fire Car Heating Co., Dunkirk, N. Y.—Full size model showing method of piping, new trap, etc., with new style of coupling. In this the slip joint is done away with entirely. Great freedom of movement is secured in all directions by two ball-and-socket joints on the end of each car. The method of coupling remains the same as before.

Union Switch and Signal Co., Swissvale, Pa.—The Westinghouse friction coupler, full size; also, new spring buffer.

The Scarritt Car Chair Co., St. Louis, Mo.—Forney car seats and a reclining chair.

Michigan Railway Supply Co., Detroit, Mich.—Central steel brake beam.

The Rotary Steam Snow Shovel Mfg. Co., Paterson, N. J.—Photographs of the rotary snow shovel.

Thomson Electric Welding Co., Malden, Mass.—Numerous specimens of electric welding.

National Car Heating Co., Portland, Me., Albany and New York, N. Y., and Chicago (successor to the McElney and the Sewall Cos.)—Couplers for steam heating.

The Chapman Jack Co., Cleveland, Ohio.—Hydraulic jack.

The Butler Draw Bar Attachment Co., Cleveland, O.—Butler draw-bar attachment.

The Griggs Electric Air Signal Co., Wilmington, Del.—The Griggs electric train signal lately illustrated and described in the *Railroad Gazette*.

The Hoffman Machine Co., Detroit, Mich.—Pendry's patent balanced throttle valve.

Fairbanks, Morse & Co., Chicago, Ill.—The Sheffield hand car, the Barrett track jack and other specialties.

The Westinghouse Air Brake Co.—The engineer's valve and the triple valve.

The McGuire Manufacturing Co., Chicago, Ill.—The Star grain car door blue prints.

Manning, Maxwell & Moore, New York.—A new boiler tube expander; the Richardson pop muffler safety valve for passenger engines; the Tabor steam engine indicator; also album of photographs of shops and machines, and Smith's portable rail saw.

Star Machine Co., Buffalo, N. Y.—Portable bellows forge.

Ruffhead Car Door Co., Williamsport Pa.—A flush door for freight cars.

C. C. Jerome, Rialto Building, Chicago, Ill.—A chart showing various applications of the Jerome metallic packing.

Cyclone Steam Snow Plow Co., Rookery Building, Chicago, Ill.—Photograph of the cyclone steam snow plow.

Guarantee Tool Manufacturing Co., 35 Nassau street, N. Y.—The Samson wrench. This is a form of monkey wrench working automatically, without a screw. It can be used with perfect convenience with one hand.

The Non-Magnetic Watch Co., 179 Broadway, New York.—A very fine display of watches.

The Shackleton Car Heating & Ventilating Co., Bound Brook, N. J.—A system of heating, shown by drawings and circular.

H. Belfield & Co., 435 N. Broad street, Philadelphia.—An improved lifting locomotive injector.

The Northwestern Modern Car Heating & Lighting Co., St. Paul, Minn.—Couplers and drawings.

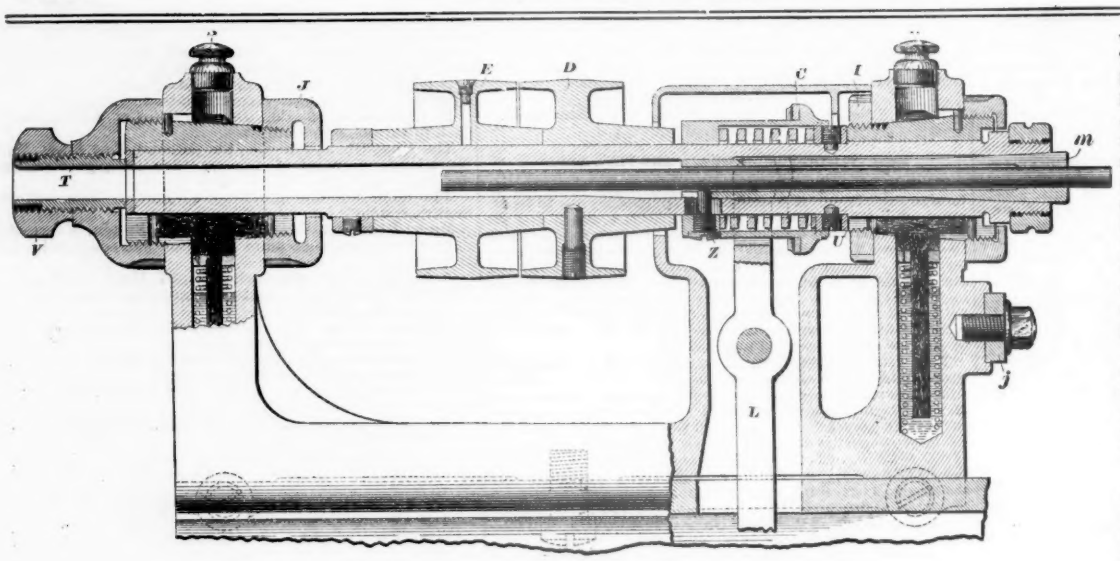
Knapp Steam Coupler Co., Syracuse, N. Y.—A universal metal coupling intended for any system of piping.

Fox Solid Pressed Steel Co., Chicago, Ill.—Specimens of pressed steel for truck frames, etc.

New Regulations for Transportation and Use of Explosives in New York City.

The Board of Fire Commissioners of the city of New York have just issued a pamphlet containing their regulations governing the manufacture, transportation, sale, storage and use of explosives in the city. The regulation for manufacture is that "the manufacture of explosives, or any process of such manufacture, is prohibited."

For transportation explosives shall be packed in double



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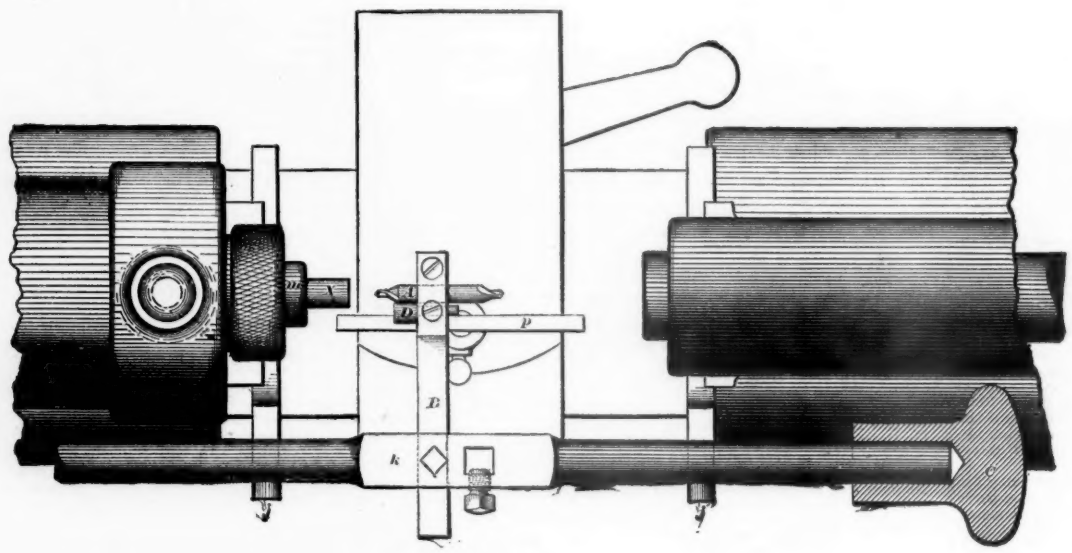

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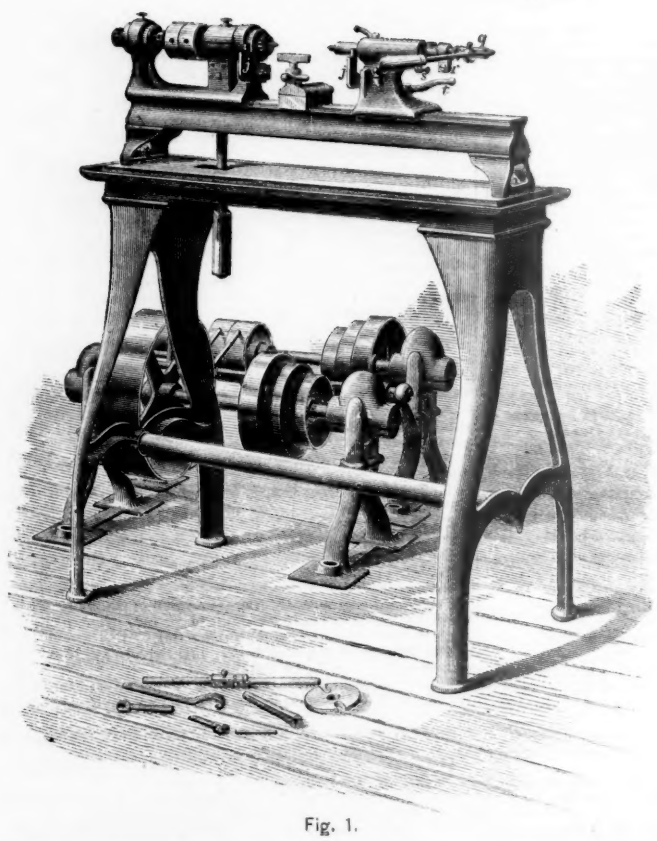

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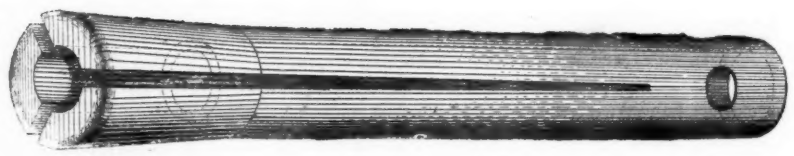

Fig. 3.

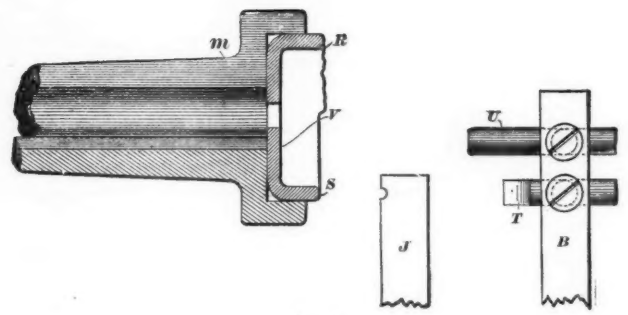

Fig. 5.

SOME APPLICATIONS OF THE HAND LATHE.

packages, the inner of which may be a case in which no metal is used, or a bag, and that to be packed in an outer water-proof box, etc., which cannot be made of metal. The maximum contents of the outer cases is 50 lbs., unless by special consent of the inspector of combustibles. No package which has been used for high explosives shall be again used for any purpose. Layers of cartridges containing high explosives should be separated by sawdust or other inexplosive absorbent. All iron or steel used in the construction of packing cases shall be effectually covered with zinc or tin. And all packages shall be labelled "Explosives—Dangerous," followed by the specific name of the explosive and of its manufacturer, and the statement, "contains nitro-glycerine — per cent. by weight; explosive absorbent —per cent. by weight," and also the date of its manufacture. High explosives which have been manufactured over one year shall not be transported.

Two classes of magazines are allowed, "mine magazines" and "hand magazines," the first to be well and substantially built of brick, stone or concrete, secure against danger from without and access by unauthorized persons. These magazines may contain 1,120 lbs. of blasting powder if 150 yards from inhabited houses, or one-half that quantity of any high explosive. The hand magazines may contain 125 lbs. of blasting powder as a maximum, or half that quantity of high explosives. Caps, detonators, matches, iron or steel tools cannot be kept in magazines. Boys less than 21 years of age, and persons who cannot read English, or are unacquainted with the properties of explosives, are interdicted, either about the magazines or in handling explosives, and smoking is prohibited under like conditions.

Hand magazines for high explosives shall secure the cartridges against getting moist, and to prevent freezing in cold weather, *i. e.*, when the temperature is below 54° F., the magazine shall be surrounded with *fresh* horse manure.

The regulations forbid the use of metallic rammers in tamping, or tamping by powerful strokes. The use of cartridges which are frozen or only partly thawed out, and an attempt to cut or break any cartridge in that state is also forbidden. Frozen cartridges may not be warmed by direct exposure to fire by putting them in ovens or on stoves or on hot ashes; and all frozen cartridges shall be returned to the foreman and not reissued until they are fully thawed. Frozen high explosives shall be thawed either by putting the case in fresh horse manure, surrounding the magazine with the same, or by placing the cartridges in a double water-tight vessel, the outer of which contains lukewarm water.

It is stated that though frozen nitro-glycerine mixtures are less liable to explode from mechanical shocks than when unfrozen, these mixtures when partly frozen, either in the process of freezing or thawing, are more sensitive, particulary to repeated light shocks, than when either frozen or thawed.

It is understood that the Fire Commissioners secured the services of Mr. Julius H. Streidinger, M. Am. Soc. C. E., who managed the successful blasting operations at Hell Gate in 1876, as an expert in drafting these regulations.

The Universal Hand Lathe.

The Brown & Sharpe Manufacturing Co., Providence, R. I., has recently published a pamphlet entitled, "The Construction and Use of the Universal Hand Lathe, made by the Brown & Sharpe Manufacturing Co.," and containing, in addition to a description of the lathe, explanations of operations performed in the shops of the manufacturers, by the aid of the special attachments. Fig. 1 is a perspective view of the lathe, and fig. 2 is a sectional elevation of the head stock. As represented, the lathe rests upon a table, but it is frequently used without the table, being attached to a bench.

The top of the bed is flat, and is scraped true to surface-plate. The bearing surfaces of foot stock and rests are also

scraped. The foot stock is secured to the bed by a clamp screw. The spindle works in a steel bushing, and is operated by a hand lever. The spindle has a movable stop *r*, which limits its forward motion when brought in contact with the adjustable stop screw *s*. The spindle and boxes of the head stock are of hardened steel, ground to a fit. There is a hole through the spindle, ½ in. in diameter, tapering at the front to a diameter of ⅝ in., the tapered portion of the hole being ground. The front end of the spindle is threaded for a face plate, the screw being protected by a nut when the face plate is not used. A step screw *T* takes up the end motion, and is clamped by a check nut *V*. The spindle boxes fit into tapered holes in the head stock; they are cut open on one side and drawn into perfect alignment and held by nuts *I* and *J*. The spindle bearings are lubricated from beneath, the oil wells being filled through holes covered with the plugs *R* and *S*. A shell chuck, fig. 3, also shown at *M*, fig. 2, has three longitudinal slits, and is ground to the taper of the head stock spindle. When fitted into this spindle a screw *Z* engages the hole at the end of the chuck, and a spring inclosed by a sleeve draws the chuck back and closes it upon the work, the sleeve sliding freely under the action of the spring. The work is released by the lever *L*, whose forked end spans the sleeve and acts upon the friction ring *C*. By turning out the screw *Z* the chuck can be removed. These chucks are made in a variety of forms for different shapes of work.

Fig. 4 shows an attachment for centering small bars and shafts. The drill and countersink *A* is clamped in the drill-holder *B*, the latter being secured to the tool-holder *k*. This tool holder slides on the adjustable guides *j j* fig. 1, and the shaft to be centred is held in a shell chuck *m*. The tool-holder has a wooden cap *C* at the end, and by pressing with the hand upon this cap the drill is brought up to the work *X*, a pin *D* in the drill-holder acting as a stop to limit the depth of the hole. Fig. 5 illustrates a method of finishing small-caps, which come from the punch-press in the form shown at *R*, and require to have the superfluous stock removed by the tool *I*, after which the edge *S* is rounded by a bead-tool *J*, the tools being fastened in the tool holder *B*, at right angles to each other, *U* being a stop-pin to regulate the depth of the cap.

Various other application are shown in the pamphlet. The use of the hand lathe is now so general in well equipped shops, that it is not necessary to say much about its special value. An extract from some correspondence published in the pamphlet will illustrate this point:

"In going through a machine shop I noticed that all of the bench lathes were in use, and that the larger lathes were idle. Ease of manipulation, I believe, is the cause of this, and the manufacturer gets the benefit of this in a saving of time."

The Mineral Products of the United States for 1888.

The following figures are gathered from advance sheets of statistics kindly furnished by David T. Day, Chief of the Division of Mining and Technology, United States Geological Survey:

The total value of the minerals produced last year was $591,659,931 as against $542,284,225 in 1887, and $465,327,888 in 1886.

The principal items are given below for the last three years:

	1888.		1887.		1886.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
Pig iron, spot value, long tons	6,489,738	$107,000,000	6,417,148	$121,925,800	5,683,329	$95,195,760
Silver, coining, value, Troy ounces	45,783,632	59,195,000	41,269,240	53,441,300	39,445,312	51,000,000
Gold " "	1,604,927	33,175,000	1,596,500	33,100,000	1,881,250	35,000,000
Copper, value in New York City, pounds	231,270,622	33,833,954	184,670,524	21,052,440	161,235,381	16,527,651
Lead " " short tons	180,555	15,924,951	160,700	14,463,000	135,629	12,667,749
Zinc " " "	55,903	5,500,855	50,340	4,782,300	42,641	3,752,408
Quicksilver at San Francisco, flasks	33,250	1,413,125	33,895	1,429,000	29,981	1,060,000
Bituminous coal, long tons	91,106,998	122,497,341	78,470,857	98,004,656	65,810,676	78,481,056
Pennsylvania anthracite, long tons	41,624,610	89,020,483	37,578,747	84,552,181	34,853,077	76,119,120
Building stone		25,500,000		25,000,000		19,000,000
Lime, barrels	49,087,000	24,543,500	46,750,000	23,375,000	42,500,000	21,250,000
Petroleum, barrels	27,346,018	24,598,559	28,249,597	18,856,606	28,110,115	20,028,457
Natural gas		22,662,128		15,838,500		9,847,150
Cement, barrels	6,253,295	4,533,639	6,692,744	5,186,877	4,500,000	3,990,000
Salt, "	8,055,881	4 377,204	7,831,962	4,093,846	7,707,081	4,736,585
Limestone for iron flux, long tons	5,438,000	2,719,000	5,377,000	3,226,200	4,717,163	2,830,297
South Carolina phosphate, long tons	433,705	1,951,673	480,558	1,836,818	430,549	1,872,936
Zinc, white, short tons	20,000	1,600,000	18,000	1,440,000	18,000	1,440,000
Mineral waters, gallons sold	9,628,568	1,709,302	8,259,609	1,261,473	8,950,317	1,284,070
Aluminum, value at Philadelphia, pounds	19,000	65,000		*74,905		27,000

*Value in alloys.

The domestic iron ore consumed in 1888 was about 12,060,000 long tons; value at mines, $28,944,000. This is an increase over 1887 in quantity of 760,000 tons, but a decrease in value of $4,956,000. Imported iron ore consumed, 587,470 long tons; total iron ore consumed, about 12,650,000 long tons, or 150,000 tons more than in 1887. Pig-iron made in 1888, 6,489,738 long tons; value at furnace, $107,000,000. This is an increase over 1887 of 72,590 tons in quantity, but a decrease of $14,925,800 in value. Steel of all kinds produced in 1888, 2,899,440 long tons; value at works, $89,000,000. This is a decrease from 1887 of 439,631 tons in quantity and of $14,811,000 in value. Total spot value of all iron and steel made in 1888, in the first stage of manufacture, excluding all duplications, $145,000,000, a decrease of $26,103,000 as compared with 1887.

Copper.—The total product, including the yield of imported ores, increased to 231,270,622 lbs., or 115,635 short tons, during 1888, which is 46,053,291 lbs. more than the product of 1887. During the first quarter of 1889 the production was increasing at even a more rapid rate. The prices received by American producers averaged 15½ cents per lb. for lake copper, 14½ for Arizona and 14 for other districts, making the total value $33,833,954. Montana led in the production, making 97,897,968 lbs. Consumption was somewhat reduced by the high prices. Our exports, however, were not adversely affected. For the past four calendar years their values have been as below:

	1888.	1887.	1886.	1885.
Ore	$6,779,294	$2,774,464	$2,411,173	$3,878,966
Ingots and old	4,899,423	1,223,260	1,960,189	3,872,553
Sheets	7,382	24,668	8,583	10,789
Manufactured and other	211,177	92,064	76,386	124,709
Total	$11,897,276	$4,114,456	$4,456,331	$7,887,006

In fact, the Americans seem to have been the only parties connected with the late copper syndicate that have any net gains at present, while our production has increased from 69,971 tons in 1886 to 100,637 tons in 1888, and our proportion of the world's production has increased from 32.6 per cent. in 1886 to 39.4 per cent. last year.

Mr. Day says of aluminum: The past year was more promising than ever before for the production of cheap aluminum. The production of metallic aluminum as an industry distinct from the production of alloys began toward the close of the year, and 500 lbs. had been made up to Dec. 31; the production of 3,000 lbs. since then indicates that the industry may continue. The exact amount of alloys produced by the Cowles process has not been furnished, but was not markedly different from the product of 1887, when 18,000 lbs. of aluminum contained in bronze and ferro aluminum were produced. The price for metallic aluminum declined to as low as $4.50 per pound for less favored brands.

The coke produced in this country was 8,527,560 tons, valued at about $14,000,000, and the natural gas consumed is estimated to have displaced 14,163,830 tons of coal. Of this amount 12,543,830 tons were displaced in Pennsylvania, 750,000 in Ohio, and 660,000 tons in Indiana. The increase in coal production was for the year over 16⅔ million long tons, or over 14 per cent.

THE SCRAP HEAP.

Notes.

The Nashville, Chattanooga & St. Louis has engaged a landscape gardener, who is beautifying the grounds of the stations on the line between Chattanooga and Nashville.

The two young men who made two attempts about a month ago to wreck the New York and Chicago limited of the Pittsburgh, Fort Wayne & Chicago, near Canton, O., have been sentenced to the penitentiary for 15 years.

The city council of Providence, R. I., is considering new plans for a large union station in that city on the site of the present "cove."

Nebraska Railroad Valuation.

The Nebraska State Board of Equalization has issued a statement showing the number of miles, the assessed valuation per mile and the total assessed valuation of the railroads in the state, as determined by the board for the present year. The total is 5,031.94 miles, valued at $29,584,325. Average assessed valuation, per mile, $5,880, number of miles in 1888, 4,892; total valuation, $28,574,489; average value per mile, $5,828; increase in mileage for the year 1889, 139; increase in total assessment, $1,009,836; increase in average assessed value, per mile, $52.

Use for the Eiffel Tower.

The idea of building three more Eiffel towers and then turning the four into the legs of a huge platform whereon a sanitarium can be built above the smoke and stir and dust and noise of cities, whither invalids could ascend in search of pure air and seclusion, is being discussed with every appearance of sincerity in Paris. The notion is certainly a big one and worthy of the age which tackles such big undertakings as a Panama Canal and a Channel tunnel; but it will not fall to the lot of invalids of this generation, I fear, or of the next either, to avail themselves of the aerial sanitarium which is suggested.—*London Figaro.*

A Fast Run on the Fort Wayne.

The Pittsburgh, Fort Wayne & Chicago has issued a leaflet giving the record of a run made by the Pennsylvania Limited, from Fort Wayne to Chicago, on Sunday, May 19 last. The particulars are as follows:

Engine No. 200—Weight, 91,900 lbs.; cylinders, 18 × 24 in; drivers, 4, diameter, 62 in.; tank, capacity, 3,600 gallons; coal consumed, 13,395 lbs. Engineman, John S. Christie; fireman, E. E. Crawford. The train consisted of one combination, one diner, and three sleeping cars; weight, 438,500 lbs. Characteristics of road: Maximum ascending grades, 26 ft. per mile, 4 2 miles; 24 ft. per mile, 4.3 miles; 18 ft. per mile, 3.2 miles; number of curves, 23; maximum curvature, 5 degrees; average curvature, 2 degrees; time consumed, 2 hours 59 minutes; distance, 148.3 miles; average speed per hour, 49 7 miles; reduced speed and stops consumed 21 minutes, leaving actual running time, 158 minutes; average speed running, 56.3 miles; fastest long distance run; 57.1 miles in 60 minutes; fastest medium distance run, 29.2 miles in 27 minutes; fastest short distance run, 6 3 miles in 5 minutes, 20 seconds, or 71 miles per hour; longest distance run for water, 84.2 miles.

The Chignecto Ship Railway.

Seven hundred men and 200 horses are now engaged on this work, and arrangements are being made for the construction of several steamers to ply between St. John, New Brunswick and the St. Lawrence and lake ports in connection with the Marine Railway.

The Road Foreman of Engines in Germany.

Commenting on an article on "The Road Foreman of Engines," which appeared in the *Railroad Gazette* some months ago and in which were set forth the functions and advantages to be derived from the employment of traveling engineers on railroads, the *Zeitschrift für Lokomotivführer* remarks that the importance of an official of this kind has not been lost sight of in Germany, but from time to time has there received careful consideration. That the institution of the office of "traveling engineer" would bring with it valuable practical results is admitted with little qualification. Still our contemporary thinks that the conditions here and in Germany are so different that in the long run an office such as we described would not be practicable in Germany. Starting with the acknowledged difficulty even here of vesting high authority in so essentially a practical man as the traveling engineer should be, the *Zeitschrift* holds that the pronounced German tendency to associate every official position with early scientific training would put the adoption of a system of supervision of locomotive engineers, as practiced in the United States, well nigh out of question. In accordance with German thoroughness, the duties of the German traveling engineer would involve the execution of no small proportion of clerical work which might and would easily be made of the first importance. The time spent on the road in carrying out what we should consider the proper functions of the office would be correspondingly cut down with the easily foreseen result that, little by little, the original purpose of the office would be crowded out of view and finally disappear altogether. The work of the traveling engineer, considered in its proper light, would thus speedily become of purely nominal value. An office of this kind, according to the *Zeitschrift* was created many years ago on several German roads, and has been given a number of different titles. The way in which our contemporary attempts to meet the obvious requirements of the German service for somebody possessing substantially the qualifications of the American traveling engineer is not quite clear, but it is not unlikely that in the near future some system will be adopted designed to fulfill them.

Railroad Lands in Michigan

The joint resolution by which the State of Michigan relinquishes in behalf of the settlers all title to the mineral lands granted the Marquette, Houghton & Ontonagon, the Ontonagon & Brule River, and the Marquette & Bay de Nocquet Railroads, which were recently declared forfeit by Congress, has passed both houses. This is the end of a long and bitter fight over the possession of hundreds of thousands of acres of valuable mineral and timber lands in the upper peninsula. Congress declared the lands forfeit last winter, but the roads still held a claim upon them and settlers could not secure a perfect title unless this was relinquished. An effort was made to add a proviso to the resolution stating that the state's title was relinquished solely that the actual homesteaders, and none else, might perfect their titles, but this failed to carry. As a result a considerable portion of the lands will be taken by the land companies and lumbermen.

For Young Engineers on "Preliminary."

The *Army and Navy Journal* prints the formula for a powder said to be adopted in the German army to prevent sore feet. The powder consists of 87 parts of pulverized soapstone, 10 parts of starch and 3 parts of salicylic acid. A teaspoonful of this powder shaken up in a sock is said to prevent soreness of the feet on long walks. The same result, as is well known, is attained by the tender-foot fraternity by greasing or soaping the inside of the sock. It is doubtful if anything is better than bathing the feet in cold water when walking is to be done regularly; but when one is called from sedentary life to take a long walk, the German powder should be very useful.

It may not be generally known that a heavy cowhide boot, which is, on the whole, the best foot gear for a rough walk, can be made to fit perfectly by putting on an extra pair of socks, and then after wetting the boots *thoroughly* allow them to dry on the feet. They are apt to prove uncomfortably tight when dry if the extra socks are not used.

A New Deck Ventilator Attachment.

Both railroad officers and those who travel by rail are familiar with the fact that it is difficult to keep the ventilating sashes in the clear story properly set for ventilation. A brakeman will shirk his duty and where the direction in which a car is running is frequently changed, as on suburban trains and other short trips, it is almost impossible to have the deck ventilators properly set. It will frequently happen that half of them are set to exhaust air from the inside of the car and the other half are set to take in the air from the outside and in this position the sashes are allowed to remain indefinitely, thus nullifying the good effect which they are intended to produce, or actually making them worse than useless. A handy device by which all of the sashes on one side of the clear story can be changed simultaneously and with one motion from one position to another will do away with the temptation to the brakeman to neglect this part of his duty. Such a device is found in the Morrell reversible trailing deck ventilator. By this arrangement the sashes are hung to pivot on the middle, so that all of the sashes are available to ventilate in either direction. A shifting rod runs through the length of the car, and by a single movement of the handle all of the sashes on that side can be opened in the direction desired. The extent to which the sashes are opened can also be graduated. The whole apparatus is quite simple, and it can be applied to old cars at small cost. Mr. Henry K. Gilman will represent the International Manufacturing Association, which controls this device, at the Master Car-Builders' Convention. The New York office of the company is No. 10 Wall street.

Bridges for India.

The South Indian Railway Co. wants iron bridges built as follows: Eight spans of 120 ft. each and 13 spans of 150 ft. each, all on its own specifications; and the Bengal-Naypur Railway Co. wants "a supply" also on its own specifications and plans.

Locomotives for Japan.

The Manchester *Guardian* asserts that Japanese orders are again coming to England, some late orders having comprised 10 locomotives, about 100 cars, and many thousand casks of cement. The diversion of orders from England, which has lasted for some three years, is ascribed to a patriotic desire on the part of the railroad builders of Japan to secure the favorable influence of Germany and France in the matter of the treaty conference. That having failed, the orders, according to the *Guardian*, return to England.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The first two days of the Master Mechanics' twenty-second convention were sufficient to stamp it as a successful one. The weather was cool and generally bright, the attendance large (about 100) and the reports and discussions were quite up to the average, if not above it. The usual provisions for the comfort and enjoyment of the members and their guests were made. The exhibit of appliances contained some decided novelties, besides a very creditable display of well-known and standard articles.

One of the most interesting reports presented is that of the committee on driver brakes; and we think that the Association and every one else interested in the subject matter of the report would have forgiven the committee had they elaborated the report a little more. It has the great virtue of brevity, but it covers so much and so important ground that the committee might profitably have given at some length the reasons which led them to their conclusions. We are told that the use of the driver brake has increased in the last two three years "in a very marked degree," but have no estimate of what is the percentage of increase in that time. The total number of Westinghouse and American driver brakes supplied up to the present time is given as 11,300. Allowing for sets supplied for repairs and renewals this would probably equip one-third of the locomotives in the country. The Eames Company reports its brake in use on 364 roads, but does not give the number of sets; so, after all, one cannot get much notion of the proportion of the locomotive equipment of the country which is supplied with driver brakes.

It will be observed that the committee recommends the Ross pattern of shoe, but has not enough data collected to say definitely what is the best material now used for brake shoes. We understand that the committee has collected considerable material showing mileage with different shoes, which will be published later. This was not presented with the report. The recommendation that but one handle shall be used to apply both the train brake and the driver brake met with some opposition, but it seems to be the correct principle. The objections were that the constant use of the driver brakes for service stops would wear the tires faster than is necessary, that there should be a reserve for emergencies, and that the use of the driver brakes for holding trains on grades is dangerous in itself and demoralizing to the brakemen. It is not contemplated that the driver brakes should be used for this last purpose. The other objections are answered by the facts that with the better brake shoes the wear of the driver tires is greatly diminished and that a device which is intended to be used only in emergencies is likely not to be used then.

Several of the mechanical engineers who are travelling in Europe this summer will devote especial attention to the subject of hydraulic forging with a view of introducing it, if advisable, into the establishments of which they are in charge. It is true that the European is ahead of us in this class of work, particularly in the case of large forgings. In small work, however, the American forging machines are doing all that can reasonably be expected or desired of them. In most other departments of mechanical work machines have been devised to reduce the labor required to perhaps 40 or 50 per cent. of what it was twenty years ago, but in the smith's shop much the same anvils, sledges, and fires, and the same number of men, are employed. The reason for this is not the impossibility of progress, but the great difficulty of getting over the obstacles which must be encountered. As soon, however, as the market prices are affected by the lower cost of forging by hydraulic and other power, then will the American mechanic come forward with designs and devices which will overcome all existing difficulties and start the wheels moving in this direction. In another decade probably the smith shop will be as scientific in its operation and require as much attention from the mechanical engineer as the metal and wood working shops, and the pattern maker will have added to his present duties that of producing quickly and accurately the large number of dies required in the satisfactory operation of the modern forging machine.

The time has come when locomotive builders need no longer hesitate about using steel in the construction of the details of locomotives. To-day steel can be obtained of good quality at prices per pound fully as low as that for common wrought iron, and the price of wrought iron of quality equal to that of the steel is considerably higher. For some time past the substitution of steel for wrought iron in the various details of locomotives at no increase of cost might have been accomplished by making a reduction in the thickness and weight of the details corresponding to the superior strength and reliability of the steel. Two years ago we saw a list of the various thicknesses, showing a comparison of the costs of wrought iron and steel sheets. Taking into account the differences in strength and other physical properties, this list showed that to do the same work in a majority of cases the steel was cheaper and more reliable. At the present time a comparison of the relative physical properties is unnecessary, because even with the same thicknesses, making no allowances for differences in strength, the steel costs no more than iron. Locomotive builders should take advantage of this desirable condition, and get rid of the roughness characteristic of tank iron. There is no reason now why locomotive tanks, side sheets, deck plates, cylinder and other casings should not be made of steel with a clean finish free from the roughness of rolled iron. It costs less to keep steel well painted than wrought iron; less loss is experienced by inferior sheets when it is necessary to flange or bend them; and, as a whole, sheet steel is a cheaper stock to use and a cheaper stock to carry than tank iron. The low price of steel has given an impetus to the steel stamping business, and several concerns are now prepared to furnish details of railroad equipment, stamped in any desired form or size. There is a slight additional cost at first for the dies, but when once made, with proper use, they have a long life. Steel cylinder head casings are now generally used by two or three locomotive works. The day is not far distant when many of the minor details of locomotives which it is desirable to make of stamped steel can be obtained at a price which will enable railroad companies to include them in their specifications for locomotives.

The *Railroad Gazette* of June 14 gave a list of roads using automatic brakes and standard couplers. Beside these there are eighteen roads which use the automatic air brake and seven which have put on M. C. B. couplers, but whose action thus far is to be regarded as experimental. They have equipped less than 50 cars each, but they nevertheless aggregate over 400 cars with brakes and over 150 with couplers. Adding these figures, the totals are 29,438 freight cars with M. C. B. couplers and 85,195 with air brakes. The New York Central & Hudson River is using Gould couplers on all new freight cars, and is also putting them on both ends of all freight cars which come to the shop for one new draw-bar. The Fall Brook Coal Company will put the same coupler on about 500 cars which are now equipped with the Ames. The Central of Georgia will soon have 1,000 new cars in service with M. C. B. couplers. It is desirable to learn now both as to couplers and brakes the indications as to future progress. The total of 30,000 cars, now equipped with automatic couplers, is but a beginning. The future of automatic brakes in the territory west of the Missouri may be omitted from the problem, as the policy of the principal lines there is pretty well settled. For the rest of the country we find the use of brakes no more definitely determined than that of couplers. The highest possible figures are but a small percentage of the nearly 1,000,000 cars now in service. A table of opinions recently published gives us no light on the prospects of reform, for the reason that the comparative importance of the persons giving them is unknown. The 23 who favor link-and-pin couplers may or may not include the 22 who have used the M. C. B. type and who therefore can speak with some intelligence. The men who favor the M. C. B. standard may belong on roads which will not order 10,000 cars in the next five years, or, on the other hand, they may be able to decide the fate of the whole question within two years. The vote should have been taken according to cars owned. The opinions to which names are attached evince hopeful minds but not much courage. General Superintendent Wade, of the Wabash, emphasizes the importance of preparing draft timbers and attachments for the M. C. B. type, whether the couplers are put on or not. The most pessimistic ought to be willing to do this much; it would then be possible to change 100,000 or 200,000 cars in a short time a very few years hence. The testimony of a trainman concerning the danger to hands and fingers in coupling old couplers with certain automatic link-and-pin couplers is significant as showing that the dangers of the transition period are not to be wholly charged to the vertical plane hook, *per se*. That American railroad managers are ready to make use of the best standards when they are fully convinced what the best standard is, is indicated by the statement of the Westinghouse people that a large number of roads are replacing their passenger air brake equipment with the new quick acting apparatus. If the value of automatic couplers for freight cars could be shown by an impressive object lesson such as that which so quickly spread the knowledge of the new brake all over the country last year, we perhaps could hope to see less doubt and apathy concerning them.

The epistles of St. Paul to the Associations are getting as numerous as those to the Ephesians and the Colossians. Some of them are "weighty and powerful:" some contain a lurking humor, as shown in the following parallel passages:

Epistle of St. Paul to the Associations, 10, 6, 1889.

"The St. Paul road considers that the main stay of the Presidents' agreement is the provision for giving some business to weaker lines, which cannot obtain it against stronger ones on maintained rates, and it certainly will not discourage this first attempt in that direction by failure to co-operate."

Epistle of St. Paul to the Romans, 15, 1, 2.

"We, then, that are strong ought to bear the infirmities of the weak. Let every one of us please his neighbor for his good to edification."

Unfortunately the Chicago & Alton was not a Roman, still less a "foolish Galatian," but a free-born American citizen, and it did not enjoy the humor of these reflections. It has, therefore, replied with some most unkind statements about St. Paul's character and motives; less humorous than the letters we have quoted, but no less forcible. All of which goes to prove that if the original St. Paul had tried writing letters to Americans instead of confining himself to Thessalonians, Corinthians, and other subjects of an effete monarchy, his published correspondence would not have been so wholly one-sided as it is at present.

We do not believe that the Trunk Line Association will accept the resignation of Mr. Fink. He is too valuable a man to lose. It is not necessary for us to bear testimony to his almost unique combination of character, nerve and intellectual ability. But we hope that the railroads will give him as long a vacation as he needs. He has been clearly overworked of late. The trouble has not been so much in the quantity of things to be done as in the strain and worry of the situation as a whole. There have been times in the past when the actual amount of business in the office, physically speaking, was much greater than it is now. There have been times when Mr. Fink himself had to deal with more figures, if not more men. But there has never been a time when so many questions of railroad policy needed settlement by an impartial authority. The Inter-state Commerce law raised new questions and lessened the chance for deciding old ones by machinery. The prohibition of pools impaired the power of making contracts, and created all the more necessity for constant personal effort. Mr. Fink was the only man who had that influence which could supply the place of a contract, and the demands upon his personal force were correspondingly greater. We are glad, therefore, that he is going to Europe, because otherwise he would probably soon have gone to heaven. In the latter

case he would be permanently lost to the trunk lines, while in the former there is a chance of getting him back again.

The communication from a Trainmaster, printed in another column, although in terms making inquiry about the meaning of certain rules in the standard code, in reality is a discussion of the usefulness and expediency of those rules. We cannot imagine that our correspondent is unable to understand what the phrases in question mean. In fact, he himself answers most of the questions he propounds. The O K is to be given as soon as an order is repeated: an order designated as a holding order holds a train at the place where the order is delivered; a train simply held is held indefinitely. These are the simple and natural meanings of the sentences quoted. It is a goood rule for any one, in the treatment of problems of this sort, to follow the practice of magistrates, who decline to decide a hypothetical case. If trains are really delayed by the present rules our correspondent should state the actual circumstances and consider each case on its merits. We have little doubt, however, that the reasons actuating the Time Convention Committee when they adopted this rule were quite simple. We do not know those reasons, but we venture to assume that the gentlemen of the committee were simply carrying out their idea of the time-honored principle of "always taking the safe side." It may be admitted that many an order if left in the hands of an operator in such a shape as to hold trains indefinitely would cause more or less delay and inconvenience. It is true that it is inconsistent with the fundamental principles of a time-table to hold back a train which would otherwise proceed on its rights; but then, for that matter, all telegraphic train orders are inconsistent with those fundamental principles. As soon as the dispatcher takes his key in the morning he is liable to at once begin overturning them. If, after he has carried on this process several hours and has a complicated array of orders in force, the wire suddenly fails him, he must have some very clear and summary method of cutting off the loose ends of his threads. As orders are liable to be of a great variety of forms and there are many contingencies that cannot be accurately estimated, the committee deemed it wise to make no attempt to provide for every case. They simply said, We will draw the line at what seems to be the safest point and accept whatever disadvantages may be entailed. It would be impossible to formulate a simple rule which would cover all cases and cause no delay. Therefore, as troublesome failures of wires are very infrequent, the most practicable, sure and sensible way out of the possible complication is to leave each dilemma to be treated in the manner that shall appear the best possible at the time. A dispatcher knowing that he had an important train "laid out" at a certain point would take measures to send word to it by a messenger or otherwise; and in the last resort a sensible and wide-awake conductor would flag himself to some point where he could get released.

The Troubles in the Inter-state Commerce Railway Association.

The withdrawal of the Chicago & Alton from the Inter-state Commerce Railway Association is unfortunate but not surprising. Many of the newspapers exaggerate its importance. If the agreement on which the association was based had been firm and strong, its speedy rupture would have been a disaster. As it was, the course of events has been that which many railroad men expected and discounted in advance.

While the general objects of the association were desirable and important, the course actually pursued in forming it had many elements of danger. In the first place, as we said at the time, the purposes of its projectors were not quite what they should be. It was formed largely under the immediate influence of financiers. These men felt the unwillingness of investors, and especially of European investors, to furnish capital for American railroad enterprises. They desired to restore confidence as a means of obtaining money for new financial operations. In one sense, this was a praiseworthy object; in another sense it was not. If the actual conditions of railroad operation could be so improved as to make American railroads deserve the confidence of investors, it was good for all parties concerned, but to obtain that confidence without fully deserving it would leave us worse off than we now are. One important element in the present depression is the duplication of roads which took place on such a large scale in 1886 and 1887. The loss of dividends is in no small measure a consequence of this. The refusal to invest more money is a healthful reaction and a necessary means toward future improvement. Although railroad earnings now are somewhat better than they were a year ago, they have hardly reached the standard of 1887, and railroad earnings per mile operated show a still worse relative condition. Under the circumstances, increased mileage without increase in traffic is the last thing to be desired. The restoration of confidence without a radical and permanent improvement in rates would have had precisely this damaging effect. This is what the bankers did not perceive. They mistook the symptom for the realty, the appearance of health for health itself. They thought that if investors could be made to think that all was well, a good result would be attained, when really it would prove but a momentary stimulus to be followed by a still worse depression. This was their first error, and the root of all subsequent ones.

Full of their desire to restore confidence, they published far and wide an account of what they were going to do before anything had been really accomplished. This is a bad mistake in any case; it was specially bad in the present instance. It committed the financiers and some railroad men to the adoption of a pretentious policy, no matter what practical difficulties might stand in the way. Instead of building their work up slowly, by quiet negotiation and gradual settlement of the practical difficulties, they insisted on the signing of a paper which should pretend to do almost everything, but leaves the means of doing it unsettled. In this respect the agreement of January last was much more like a piece of Congressional legislation than a business document. No one familiar with the preliminaries can fail to see how much pressure was put upon those men who felt the practical difficulties or insisted on the unwisdom of making promises until you had some assurance that you could perform them. The railroad president who approved of the agreement met with the approval of public sentiment; the man who opposed it, however good his grounds, incurred odium. Practical objections, though backed by bitter experience, were lightly waved aside in the same way that a political body shuts its eyes to the practical objections to trade legislation which happens to please the popular feeling of the time. If a man asked what a clause meant he was told to sign it first and find out what it meant afterward.

Yet if there ever was a time when careful action was needed, it was the beginning of the year 1889. A railroad pool or combination had to contend, not merely with the general difficulties which are always hard to overcome, but with special difficulties raised by the Inter-state Commerce law. It was as easy to make a nominal agreement as ever, but it was much harder to enforce it. No wonder that those roads whose consent to the arrangement was extorted by pressure or given with reservations have proved an uncertain element from the start. No wonder that the first serious question which has arisen occasioned the withdrawal of an important system. This withdrawal takes place under circumstances which show how much irritation has been felt in the immediate past. It is not based upon the failure of the Executive Board to comply with any of the Alton's demand, for the lumber rate troubles seem to be left in the background for the moment, and the live-stock has been diverted back to its original channels by order of the Board itself. It is based upon sweeping charges of bad faith against another road.

It is hard enough to maintain rates when all the roads go willingly into the association. When some go in reluctantly, the task becomes an impossible one. Whether the charges against the St. Paul were well founded or not, the feeling of the managers of the Alton rendered its speedy withdrawal necessary. In one sense we do not regret this result. The real difficulties of the situation must sooner or later have manifested themselves. We believe that it is much better that they should become obvious at once, before new capital has been attracted by false pretenses and before additional railroad construction, thus stimulated, has made the Northwestern rate problems still harder than they now are. We believe that it is well for the bankers and financiers to see that a mere agreement of presidents is not enough to reform the existing evils, but that the machinery for carrying such an agreement into execution must be carefully discussed before we can tell how it will work. In the language of the day, we believe that the promoters of the enterprise have been properly punished for being "too previous." On the other hand we do not think that the withdrawal of the Alton will prove a death blow to the whole scheme, but only to the exaggerated hopes of a few of its promotors. We have great confidence in Commissioner Walker and in the good sense of most of those who are associated with him in trying to resist the present demoralization of rates. If people will stop expecting the association to accomplish what it cannot, the way will be clear for it to try to accomplish what it can. The first step toward clearing the way is the withdrawal from the association of those roads which do not really want to belong to it. The Alton is such a road. Its traditions have looked toward independent action rather than toward combination. Two years ago it made a fight in favor of paying passenger commissions, although the associated railroads and the United States authorities alike disapproved of the practice. This was an extreme instance of the attitude of the road, but not on the whole an unfair illustration of it. Under these circumstances the association is better off without it than with it. It has been in general a conservatively managed road and is not likely to pursue the policy of a free lance. Its withdrawal will probably remove more disturbing elements than its independent action will create.

A Word on Modern Car Construction.

In connection with the illustration on another page of a fine example of a modern box car there are several features of recent development in car construction to which we wish to call attention. It has become the desire and intention of master car-builders on several of the most progressive roads to build their flat, gondola and box cars on the same general plan of sills, bolsters and trusses as far as possible. It is now, with such builders, the intention to carry all of the load by means of the truss rod and floor sills. It is not intended that the side framing of the house, or covering, of the car shall in any way be considered as supporting the load on the car floor. The framing of the sides and ends is designed with special reference to the shifting of the loads, the resistance to buffing shocks and the swinging of car bodies when passing around curves at high speeds. The strains, when considered from this standpoint, are radically different from those which are the result of an attempt to carry the floor load by means of the side framing. Therefore, the careful observer will notice that most of the new designs of freight cars now constructed in this country are radically different in side framing from those built several years since.

In calculating strains on the trusses and sills, it is customary to allow for a uniformly distributed load over the car floor. The amount of the load is equal to the capacity of the car, increased by a factor of safety, which must include the consideration of the load as being suddenly applied, and must also comprehend the class of work which the car is intended to perform. Cars when constructed upon this principle will give far less trouble from sagging; the trusses and sills having been designed to carry the load without other assistance can be readily adjusted to any camber and keep at that adjustment. There are several details of construction that need careful attention in order to get the best results. They may be mentioned as follows:

a. An increase in diameter of truss rods in the body.

b. An increase in the end of the truss rod to such an extent that the diameter at the bottom of the thread, where the end is screwed on and where the turn-buckle is fastened, shall be greater than the diameter of the body of the rod.

c. An increase of the bearing of the truss rod plates on the end sill. The amount of this increase must be considerable. It is doubtful if a too large bearing can be obtained at this point within the ordinary limits of design.

d. An increase in the depth of the trusses, *i. e.*, the distance between the centre of the sills and the centre of the truss rod, vertically. The greater this distance the more rigid will be the truss when framed, and, further, the deeper the camber, the less will be the pressure at the end bearings of the truss rods on the end sills; a reduction of this end pressure is most desirable owing to the difficulty of obtaining sufficient area of bearing for the washer.

e. Attention must be paid to the lateral bracing of the truss rods of great camber, otherwise they are liable to move laterally and allow the car to sag.

The car shown in this issue was designed with these principles in mind. It is the result of extended investigation by the officers who designed it, and in service has given results which show the correctness of their conclusions, the substance of some of which is embodied in these remarks.

The Car Accountants' Convention.

The fourteenth annual meeting of the Car Accountants' Association will be held at Mackinaw Island, Mich., next Tuesday. In view of the interesting work

laid out for the convention by the committee on subjects for discussion, a full attendance is anticipated. The place of meeting seems to be somewhat isolated, but this association has a reputation for attending strictly to business, and isolation is good for that purpose. The business in hand is of the first importance. The members of this association can take credit for a good share of the progress in matters pertaining to their department which the railroads have made during the past two years, and they should see to it that the intricacies of the per diem question, the importance of uniformity in detail work of the car accountant's office, and the other matters decided upon for discussion, are made clear to the many who are still in doubt and clearer than ever to those who are prejudiced or unenthusiastic.

The statistics collected by the per diem committee and submitted to the Time Convention showing the service of cars on forty-seven roads, have furnished a basis for much discussion during the past year as to the merits of the different plans which have been proposed for the introduction of per diem charges, and the present situation may be briefly recalled. The Atlanta meeting (1887) recommended the adoption of the mixed system on the basis of ½ cent per mile and 15 cents per day; this was favorably reported on in 1888 by the Time Convention committee, but the question was referred back to the committee by the convention for further investigation. At the October (1888) Time Convention the statistics above referred to were submitted by the committee of the Car Accountants, who took occasion to reaffirm their belief in the principle of the mixed system, but suggested that the statistics indicated that the rate of ½ cent per mile and 10 cents per day would be more acceptable and fairer to a large number of roads. This latter rate is the one that the majority of the roads in the Time Convention voted two months ago to put in effect from Jan. 1, 1890. The statistics, however, have not yet been considered by the Car Accountants' Association as a body, and there is much interest manifested to know whether the members will indorse the views expressed by their committee and adopted by the Time Convention or will stick to their original recommendation of the ½ cent per mile and 15 cents per day rate, or take new ground altogether. As the per diem system is not to be put in operation until January, they will still have an opportunity to present any further recommendations they may wish to make with regard to the matter to the October meeting of the Time Convention.

One day of the coming meeting is to be entirely devoted to the examination of the system and details of keeping car records and other matters pertaining to car service departments, with a view of bringing out a full discussion as to the merits of the different plans in use, each road having been requested to furnish a complete set of all its car service blanks. Such a discussion as this should be of real practical value in affording an opportunity to each car accountant of knowing how the service is conducted on other roads, and of picking up new ideas to be put in use on his return home for the improvement of the service on his own road. The importance of the car record office, as connected with the active operations of a road, has received considerable recognition during the past few years, a large number of roads having transferred the office from the accounting to the transportation department; but as the extent of the usefulness of this office is dependent upon the information to be obtained from it, still further investigation of its methods will not be amiss, and should receive the attention and co-operation of all roads.

The value of a clearing house as a means of looking after cars is a subject which has engaged the attention of a good many car-service men, and one which should be discussed at this meeting. It is a well known fact that some roads obtain much better service from cars than do others. For this various reasons are adduced. Local conditions which cannot be accurately compared with those in other territory are often important and are recognized; but yet in other cases are claimed to be of little influence as compared with the plan under which the work is done. Many car-service men complain of the long detention, misuse and small performance of cars going into New England, and attributes this to the want of a better car-service system on many of the roads there. They claim that the New England clearing-house is economical and practical so far as computation of mileage and making settlements is concerned, but not efficient in securing prompt movement and preventing misrouting. The moving of cars promptly and efficiently must be attended to by an energetic officer very closely connected with the department which does the work, and it is claimed that a clearing house operating at arm's length cannot do this. The introduction of a per diem system, either in complete form or modified, the establishment of demurrage bureaus and other reform measures which are likely to be important features of car service work in the near future, render it particularly desirable that the merits and demerits of all means for conducting this branch of the business be very fully discussed. An experienced car service man has suggested that car service bureaus, which, in consequence of the successful experiments at Omaha and Chicago, are likely to be established in numerous cities at an early date, may prove useful as clearing houses for the computation and settlements of interchange car service charges, this department being made a special branch of the bureau. The complicated nature of all railroad operations which are affected by competitive business now renders any concerted movement so extremely difficult that it is impossible to say off hand how much merit there is in this proposition, but the car accountants should be able to present facts from their experience which will help to a solution.

The diversion of foreign cars from their legitimate routes is an evil which seems to be growing greater instead of less, and it does not appear that the per diem rate for interchange or the collection of demurrage from consignees will do much toward curing it. If it is to be remedied at all it will probably have to be by means of a money penalty to be paid by the road responsible for misuse. The Time Convention has once voted against the adoption of any rule enforcing a penalty, and it is doubtful whether the friction engendered by any measure so stringent would not be quite as harmful as is the present state of things, but it is to be hoped that those who favor the enforcement of a penalty will not fail to agitate the subject and to keep the facts well before the Convention. If positive action does not seem desirable or cannot be secured, agitation may be of some avail.

The Chicago-St. Paul Situation.

Where there is smoke there must be fire, and surely there is smoke enough about the St. Paul freight rate situation. At the beginning of the lake season the first class rate from the seaboard to St. Paul or Minneapolis via Lake Superior, was fixed at 89 cents. The same rate was made via Chicago, granting the Chicago-St. Paul roads 38 cents when the traffic came via Lake Michigan. Meanwhile the lake rate to Duluth was 70 cents, as compared with 54 cents to Chicago, about the whole of this advance over the Chicago rate going to the Northern lake lines.

There are good reasons why the Lake Superior lines should have a larger revenue per 100 lbs. than the Lake Michigan lines, the density and regularity of the traffic and the presence of such strong tramp competition making rates to Chicago from Buffalo naturally lower than to Duluth. Perhaps this disparity was made too great; such would seem to be the logic of the outcome, for the first-class price, New York to Duluth and St. Paul, was soon reduced, and to-day (the 21st) is made the same as to Chicago, 54 cents. The Trunk lines are more or less closely connected with the Chicago & Northwestern and Chicago, Milwaukee & St. Paul, while the holdings of stocks are known to be somewhat in the same hands. The extreme difficulty of the position of these roads under these reductions was foreseen, and, doubtless, was one great reason for the difference made by the Lake Superior lines in their rates from Buffalo, as compared with Chicago, till recently. Some reduction of these differences was, however, almost certainly inevitable, considering that the distances by lake from Buffalo were substantially the same to Superior as to Michigan ports. This last reduction of the New York and St. Paul rate to 54 cents is an extreme one and may have been made by the Lake Superior Transit Co., the strongest Northern lake line, for the purpose of forcing a solution of the problem. This last rate, while it continues, must stop shipments to St. Paul via Chicago, and, even if advanced, will leave but a few cents to the rail carriers from Chicago. Already the Chicago shippers are threatening all the terrors of the law because these roads have been taking New York freight to St. Paul for 28 cents first class while charging local shipments 60 cents, but it was this or nothing, and this alternative does not seem likely to be any less severe while navigation lasts. The situation seems to be, can the combination compel St. Paul rates from the seaboard to be made on a Chicago basis plus a local Chicago to St. Paul? If not, the Chicago roads have a choice of three things: First, a reduction of all local rates to the proportion compulsory on through; this would be a loss so serious as to reduce local rates throughout the whole systems and perhaps below fixed charges. Next, an abandonment of the through traffic between St. Paul and New York to the Burlington and Northern, which it is conceded has no local business to speak of, and must continue to compete for the through. Practically this is almost as bad as the first, for this road crosses the other roads at La Crosse, Prairie du Chien, Winona, etc., and the local rates, if compelled to be reduced from those points, would unsettle the whole. The last alternative is a local rate independent of the through. This is what Chicago merchants are anticipating, and around this, from the present outlook, the fight is to come. Of course, such a plan would stop the Chicago jobbing trade in the whole Northwest, and this is a prize worth spending money to keep.

In the case of the Milwaukee Chamber of Commerce against the Flint & Pere Marquette, where the latter made a rate on flour and grain 2½ cents less from Milwaukee to New York on through St. Paul shipments than on shipments from Milwaukee proper, Commissioner Bragg decided that the fact of the St. Paul road charging to Milwaukee a fixed sum did not invalidate the claim that there was a through rate to New York, and hence the case against the railroad was dismissed. The commissioners added that a difference of 2½ cents per 100 lbs. was not much, but that the relationship between through and local was always open to the judgment of the commission. The Chicago people are confident that the difference between 60 cents local and 28 cents, proportion of through rate, would be promptly condemned. Then they rely on the precedent of that Hannibal grocery case, wherein the jury decided that 12 cents difference between a Hannibal local rate and a Missouri Pacific proportion of a through Chicago rate was an undue advantage to the latter. However, the whole matter may come out it is likely that the railroads between Chicago and St. Paul will lose a portion of their revenue which they can ill spare.

The Pennsylvania railroad has had several thousand men at work on its various lines affected by the flood and succeeded in opening the main line between Harrisburg and Pittsburgh on Friday, June 14, just two weeks after the disaster, and all through trains, except the New York and Chicago limited, were resumed by Saturday. Considerable portions of the line were single track, and it was not expected to have the double track completed much before June 22. The route via Sunbury, Lock Haven and Tyrone was used only one or two days, the main line being ready nearly as soon as was the Bald Eagle Valley road. The road announced that it would receive through freight by the middle of this week. Many consumers of coal, coke and other commodities at points on the Pittsburgh division had nearly consumed their stock on hand before the re-umption of traffic. The New York, Lake Erie & Western was crowded with a great volume of through freight occasioned by the break in the Pennsylvania, and the Baltimore & Ohio secured a good deal of passenger traffic between New York and Philadelphia and Pittsburgh, having put on a special line of sleeping cars between these cities. Vice-president Frank Thomson and other officers of the Pennsylvania took an active part in the construction of the temporary work and were on the ground continuously for a week or more. Chief Engineer W. H. Brown, while sounding the river at Mayes Bridge, near Lewistown, had a narrow escape from drowning, his boat capsizing and throwing him into the river. It is announced that the company has already given out contracts for building new stone viaducts at three or four important points, including those on the Conemaugh east of Johnstown. The total damage to the Pennsylvania, including the Northern Central and Philadelphia & Erie, is roughly estimated, by a newspaper correspondent who seems to have talked with some of the officers of the road, at $1,500,000, divided as follows: 5,000 men 15 days at $2 per day, $150,000; lumber and materials, $100,000; replacing bridges, $500,000. Other extra work is counted at $250,000 more, making in all about $1,000,000. A half million dollars is allowed as the probable value of the locomotives and cars destroyed and of the freight in transit lost or damaged. The loss from interruption to traffic is not included, but approximate calculations put it at $400,000 net earnings.

The Philadelphia & Reading, whose principle trouble was between Sunbury and Williamsport, got its line to Williamsport in operation a little before the Pennsylvania. The company concentrated its forces and succeeded in completing the temporary bridge over the Susquehanna at Sunbury 17½ hours ahead of the Pennsylvania.

Serious floods doing a great deal of damage to various railroads were reported in Kansas on Sunday, and in Southern and Western New York on Monday and Tuesday of this week. Many highway bridges were washed away in the vicinity of Fort Scott, and the railroads there had extensive washouts. At Jamestown, N. Y., many bridges were carried away, and the New York, Pennsylvania & Ohio and other railroads had bad washouts. All the roads in the vicinity of Elmira, N. Y., had to suspend train movements on account of the washouts and landslides. The yards and shops of the New York, Lake Erie & Western, at Hornellsville, N. Y., were flooded, and many temporary highway bridges erected after the flood of June 1 were carried off. At Peru, Ind., on Tuesday, a destructive wind storm destroyed several buildings, and some freight cars of the Lake Erie & Western were blown by the wind through the walls of the company's shops

The New York & New England Terminal Co. has secured control of large piers at the foot of Rutgers and Jefferson streets on the East River in New York City and will erect iron sheds thereon to accommodate the traffic of the New York & New England and the Housatonic roads which is to be taken to and from the southern terminus of the roads at Wilson's Point, Norwalk, Conn., by floats and steamers. The utterances of President Bostwick reported by the New York papers indicate that the companies will compete for passenger business between Boston and New York, calling this a "water route," and making the rate $3, the same as the price by the Sound steamers, though the rail ride (via Hawleyville), would be about 200 miles and the water route less than 40. The time proposed is "about two hours shorter than that of the Stonington line" which would be about three hours longer than the all rail night trains.

The New York Board of Trade and Transportation, which was the principal plaintiff in the well-known car-load lot cases brought before the Inter-state Commerce Commission last winter, has passed resolutions protesting against the introduction of the Trunk Line official classification into Southern territory by the action of the through lines between New York and New Orleans. They cite the fact that the large differences between carload and less than car-load rates which characterize this classification have been heretofore comparatively unknown in Southern territory, and assert that just geographical and transportation considerations are violated by the present change. It is reported, by the way, in dispatches from Washington that a decision in the carload load lot cases may shortly be expected from the Commission, much of the delay having been occasioned by the sickness of Commissioner Schoonmaker.

The Inter-state Commerce Commission has issued a new and revised edition of the Rules of Practice before that body, adding several new ones that have been found necessary by experience, and containing also concise and complete forms for complaints and other proceedings before the Commission. Care has been taken to make these rules as simple as possible, and by their aid business men can, if they desire, prepare their papers themselves. The Commission desires to have the rules generally distributed, and on application, the Secretary will furnish copies without charge.

The Legislature of Indiana has passed a law requiring railroads to destroy thistles and other weeds on all lands occupied by them; this must be done every year between July 1 and Aug. 20, and the penalty for non-compliance is $25. As the fine may be sued for before a justice of the peace by any aggrieved person the amount named must evidently be multiplied by the number of land-owners along the line. While roads will doubtless for their own interest cut down all weeds before they go to seed, the provision of the law which requires *all* roadway to be cleared is rather absurd. Where a railroad lies along a worthless swamp or an extensive tract of timber the noxious character of the weeds outside the fence might counteract any amount of care on the part of the trackmen.

NEW PUBLICATIONS.

Time and Speed Chart. By E. S. Crull. Rand, McNally & Co., Chicago, price $1.

This is a handy pocket book, by which the rate of speed at which a train is running can be quickly found when the time and distance are known: the time necessary to run a certain distance when the rate of speed is given, and the distance covered in a certain time when the rate of speed is known can also be readily found. The work is similar to Fleming's Time-table Constructor, but it is arranged on a different plan, the rate of speed being at the head of each page, and the distances and times printed in order down the columns. It also gives figures for tenths of miles, while Fleming shows nothing but even miles. The latter shows nothing higher than 100 miles at 60 miles per hour, while Crull's compilation extends to 150 miles at 69 miles per hour. There is little choice between the different plans pursued, though we should judge that Fleming's work is the handier for timing trains, while Crull's is the better adapted for making up time-tables.

Foreign Technical Notes

In Hungary the government has recently acquired a line which completes the state railroad system to Fiume, on the Adriatic, the Hungarian seaport. The government has long done all it could to develop the commerce of this port, but the road just acquired was often not willing to accept the very low rates which the government proposed for this purpose.

The last report on the railroads of the German Empire classes about one-ninth of the length of the roads as within station limits; the rest as "open road." Of the latter 10,565 miles were single track, 10,933 double-track, and 52 miles had three or more tracks. The number of railroad cross ings at grade was 129; overhead, 262; underneath, 309. The number of junctions between stations was 853. Highway or street crossings at grade numbered 59,202; overhead, 2,744; underneath, 9,288. The weight of iron ties (or other iron sleepers) increased from 730,000 to 770,000 tons during the year. The average weight of rails, where T rails are used with cross-ties (as in nine-tenths of the track), was 110⅝ tons per mile, or 70½ lbs. per yard; and the average weight of joints and other iron used was 25,016 lbs. per mile. Nearly one-half of the rails in track are still iron, and only 644 miles were changed from iron to steel during the year. The length of track on iron sleepers was 9,159 miles, and increased 659 miles during the year, while the length on wooden ties increased but 394 miles. The average number of wooden ties per mile was 1,765—just about a yard apart, and 73½ per cent. of them were impregnated with some preserving mixture.

The lake of Lucerne is getting to be pretty well provided with mountain railroads. Besides the two famous ones up the Rigi there has been one for some time directly south of Lucerne up the Burgenstock. This spring a fourth, to the summit of Pilatus, at the west end of the lake, has been opened. Pilatus is higher even than the Rigi; but more likely to be cloudy at the summit, which is 6,792 ft. above the sea. This is probably the solidest of all the cog wheel mountain railroads, which are now numbered by the score in Switzerland. The substructure is of masonry, capped with granite. All the bridges are of stone. There are seven tunnels, from 35 to 317 ft. long. The superstructure is wholly of iron and steel, fastened to the masonry substructure by strong screws. The cogged rail is raised somewhat above the level of the other rails. It has a double row of vertical cogs cut out of the solid bar. The engine and car form a single vehicle, with seats for 32 passengers, with four cog-wheels which engage in the cog-rails in pairs. In running down, all the wheels can be braked with automatic brakes. They were built by the Swiss Locomotive Works of Winterthur.

Many of us will remember a visit made to Russia a few years ago by sundry American capitalists and engineers, for the purpose, it was said, of engaging in some great enterprise involving the development of vast fields of valuable coal in that country. We have not heard that they actually engaged in the proposed enterprise, and it would seem that no one else has, if we may trust a report in a German paper that the Minister of Transportation has recently felt himself compelled to authorize the Kursk, Charkov & Asov Railroad Co. to purchase English coal for its own use. The newspaper reporting this says this fact is equivalent to the "moral bankruptcy of the Russian coal industry; for this railroad runs directly through the Donez coal field, whose vast wealth of coal has been widely proclaimed." Now there is talk of forming a company for preparing peat for fuel, by a promising new method, there being vast expanses of peat bogs in the country.

The head of the Austrian State Railroad recently spoke in Parliament of the use which his administration had made of its power to grant free passage, "traveling favors" in the Austrian euphemism. He said that 2,500 had been issued to paupers (if that is the proper translation for "persons wholly propertyless"), and 1,500 to various other persons who he explained were chiefly their own employés and their families, and persons to whom they were granted for commercial reasons, which means, we suppose, "on account of freight." This, he thought, was not much, considering the millions of other passengers carried. He didn't see his way clear to abolish the practice entirely so long as the other railroads maintained it. As to a charge that members of Parliament ride free, it was not true. Even the managers of the railroads had to pay, and the members of the boards of directors of the private railroads.

The Austrian Minister of Commerce has called attention to the great number of rebates and other special reductions of rates which the Austrian railroads make, and which, in accordance with the law, they are compelled to publish in a sort of Austrian *Railroad Gazette*. These numbered 3,490 in 1886, 3,671 in 1887 and 4,065 last year. He says that many of these are substantially repeated year after year, and he proposes that, when they have thus been shown to be permanently necessary, they be included in the regular rates, and the special reductions be confined, as far as possible, to cases where required temporarily, and especially he recommends the greatest possible restriction of the payment of rebates.

Railroads and Locomotives in England.

Those who are visiting England this summer may be interested to know the total locomotive equipment of the country, and wish to become familiar, in a general way, with the peculiarities of the different roads. The following extracts from a paper by Robert G. Smith, Stevens Institute, published in the *Indicator*, will give some particulars which were gathered in a recent visit to England.

The most noticeable point about trains in England, aside from their appearance, is the great number that are run; this, of course, signifies many locomotives. There are, in round numbers, 15,000 locomotives in use on English railroads, whereas there are about 30,000 in this country. The number of locomotives on each railroad is as follows; there are, perhaps, 20 or 30 other smaller roads having from 5 to 100 locomotives each:

	Locomotives.
London & North Western	2,500
Midland	1,800
Great Western	1,600
North Eastern	1,500
Great Northern	800
Great Eastern	700
Caledonian	700
North British	600
Lancashire & Yorkshire	600
Manchester, Sheffield & Lincolnshire	500
London & South Western	500
London, Brighton & South Coast	500
South Eastern	400
Glasgow & South Western	300
London, Chatham & Dover	200
Great Southern & Western of Ireland	200
Great Northern of Ireland	150
Midland Great Western of Ireland	100
North Staffordshire	100
North London (suburban)	100
Underground lines	100

The London & North Western runs from London to Liverpool, forms part of the west coast route to Scotland, and branches out to every city in the northwestern counties of England. For running the fast and light traffic, engines with single driving wheels are used. The new express engines have four driving wheels, with a pair of leading wheels which have radial axle boxes. For heavier traffic a similar type is used, which has smaller wheels. There are about 100 passenger locomotives on the Webb compound system. The freight locomotives are the standard English "goods" engine. They have six driving wheels, all flanged and rigid, and the cylinders are placed inside. There are several sizes of these. These locomotives are also used for heavy passenger trains and for shifting purposes.

Suburban traffic is worked by a variety of locomotives, the standard pattern having four driving-wheels and a leading and a trailing pair of wheels, which have radial axle-boxes.

The workshops of this company are situated at Crewe, and are remarkably comprehensive, as they include blast furnaces and steel plants. There are two Bessemer plants, each with two 5-ton converters. A 20-ton Siemens-Martin furnace is in use, and a similar one is building. Rails, boiler-plate, wheel tires, etc., are all made here.

The Midland.—As its name indicates, this line runs through the midland counties of England, from London. There are more curves and heavier grades on this than on the other trunk lines. In this respect it resembles an American road more than the others. The nature of the road has necessitated the adoption, finally, of the bogie truck. The passenger carriages now built, instead of being mounted on six wheels attached to the frame, are quite long, and are carried on two four-wheel or six-wheel trucks.

The locomotives for express service somewhat resemble our own; they have four driving-wheels and a leading four-wheeled truck, called "Adams' bogie." For freight service the standard "goods" type is used, having six driving-wheels and inside cylinders. Suburban traffic is worked by engines having side tanks. They are arranged according to the Forney plan, with four driving-wheels and a four-wheel truck behind.

The shops of this railroad are located at Derby, where all the building and repairing is done. The engines and cars of this road are painted a dark red color.

Great Western.—This line runs from London to Birmingham, etc., and to the western coast. It is peculiar, in that it has a broad-gauge track 7 ft. in width, running from London to Plymouth. An extra rail is laid, like the Erie Railroad's old 6-ft. gauge, alongside the rail of the standard gauge. There are but a few broad-gauge engines left, but there are some seven or eight trains each way daily, which are very comfortable and run with great speed. The rails are laid on longitudinal sleepers, which are held together about every 8 or 10 ft. by cross-ties. The rails used are those invented by Brunel, and are similar to the American centre-bearing street-car rail.

The broad-gauge express locomotives are those originally built by Daniel Gooch in 1848, but they have been entirely rebuilt, although almost exactly on the same lines. These engines have no domes; the boiler is 54 in. diameter, and the steam pressure carried is 140 lbs. The cylinders are inside.

Standard gauge express trains are drawn by engines with single drivers, and single leading and trailing wheels.

For general passenger work, there is a class of locomotives having four driving wheels, with a leading pair of wheels, and inside cylinders. Two classes are used for local passenger trains, each having four driving wheels, inside cylinders and side tanks; the first class have a pair of leading wheels, the second a pair of trailing wheels. The locomotives on this railroad are painted dark green.

North Eastern.—This line forms part of the east coast route to Scotland, and runs from York and Newcastle to all parts of that section. The passenger locomotives have four driving wheels, a pair of leading wheels, and cylinders inside. The freight locomotives are of the standard "goods" type. There are a number of Forney locomotives in use on local traffic. The most interesting feature of this railroad is a number of locomotives built on Worsdell's compound system. In this arrangement, two inside cylinders of different diameter are used, one for high and the other for low pressure. The slide valve is on top of the cylinders, and Joy's valve gear is used. The express engines are built on this system, and have four driving wheels with a four-wheel leading truck. This railway differs from others in England in having several shops, for both repairing and building, along its line.

Great Northern.—On this road, which runs from London to York, and forms part of the east coast route to Scotland, travel the finest looking express locomotives in the world. These locomotives have a single pair of drivers, a pair of trailing wheels, and a four-wheel truck or "bogie" in front. The driving wheels are 8 ft. in diameter. For local passenger trains two classes of locomotives are used; both have inside cylinders and four drivers, one class having a pair of leading wheels and the other a pair of trailing wheels. Those used for freight service are the standard "goods," but fast freight trains are often run with the second class of passenger engines just mentioned. Shifting is done by six-wheel saddle tank engines with inside cylinders. Suburban traffic about London is handled by heavy Forney locomotives, with inside cylinders.

The shops of this line are at Doncaster. In the erecting room hydraulic traveling cranes are used. This company paint their locomotives green.

Great Eastern.—This railway's business is between London and the eastern coast.

There are a number of varieties of locomotives on this road. There are some single-driver express locomotives, something like those on the Great Northern.

The old class of passenger locomotives have outside cylinders, four driving wheels and a leading pair of wheels. Some of these have been rebuilt with larger boilers, and with a four-wheel truck or "bogie." They are extremely ugly engines, with round connecting rods, ornamented splashers and an open cab. The new passenger engines have inside cylinders, four driving wheels and a pair of leading wheels with radial axle boxes. The standard six-wheel "goods" engines are of several sizes. For shifting purposes a very neat six-wheel engine with side tanks is used, having inside cylinders.

There are for suburban traffic two classes of tank-locomotives. Both have inside cylinders, four driving wheels and side tanks. One has a four-wheel truck behind, as in the Forney type; the other has a single pair of wheels in front and behind, which have radial axle boxes. The locomotives of this railway are painted dark blue.

The shops are located just outside London, at Stratford. They were commenced forty years ago, and the plant is a large one but not arranged in as convenient a way as a modern one would be laid out.

The Westinghouse air brakes are used on this railway, and in tank engines the air reservoirs are copper tubes of large diameter, running along under the tank on each side.

Caledonian.—This line runs from Carlisle to Glasgow and Edinburgh, being part of the west coast route to Scotland. It is remarkable that this railway uses locomotives almost entirely with outside cylinders. Most of the passenger engines have four driving wheels with a small leading pair.

Some Forney locomotives that look very much like our own are also used.

North British.—This railway is the northern end of the east coast route to Scotland, and runs to Edinburgh and Glasgow. It has a number of eight-wheel passenger engines with inside cylinders, which are used for express service. The older locomotives on this road have no domes.

London & South Western.—Most of the passenger locomotives used on this line differ only in detail from our standard, and are very handsome engines. There is a very fine class used for local traffic; these engines are of the "bogie" type, with the frames extended backward in order to carry the water tank, this being supported by a pair of small wheels. It is exactly the reverse of the "Hudson" locomotives used in this country. Water is also carried in side tanks as well.

London, Brighton & South Coast.—It is remarkable that while so much trouble is taken to have small wheels in front of a locomotive in order to insure safe running, this railway runs express trains with locomotives having four large driving wheels in front, with a single pair of small wheels behind. The flanges on the second pair of drivers are cut away. The

cylinders are placed inside. For the numerous light trains that are run, two classes of side-tank locomotives are used. The first class have wheels arranged as in the express engines just described; the second class have six driving wheels, and are much smaller than the first. The locomotives of this railway are painted an ochre color and are very carefully finished. They are fitted with speed indicators and other contrivances. The Westinghouse air brake is used.

North London.—This is principally a surface railway, but runs at times on viaducts and through tunnels. A very large local passenger business is done throughout the northern part of the city, and all the locomotives are in constant use. The locomotives are "bogie" engines, with four driving wheels and a four-wheel leading truck. The cylinders of most of them are outside, and water is carried in saddle tanks, no tender being used. There are some six-wheel engines that resemble very closely the shifting engines (Class D) on the West Shore.

The shops are situated in Bow, East London, and with the exception of a few of the older locomotives, all have been built at these shops. These are the first shops that the writer visited, and many things here noticed are not at all peculiar to this railway alone.

All drawings of locomotive are colored by a brush, to indicate the material to be used. In the erecting shop a whole drawing of each class, thus colored, is hung up on the wall. The detailed drawings are supplied to workmen in the form of tracings on two rollers. No blue prints seem to be used in England; all tracings are made by girls.

Copper fire boxes are used, with wrought-iron stays. The thread is cut all along the stays, but it is turned off in the middle. A hole is drilled in each end of the stay. Giffard's injector is used on the locomotives. In the new engines the almost universal screw reverser is superseding the hand lever; a traveling pointer shows the point of cut off. The side rods have solid ends; they are first forged into rectangular section, and then are channeled out in a milling machine.

All the locomotives on this line use water from a tank above the engine shed. The water is city water, but is forced through many thicknesses of cloth which has been washed in dilute sulphuric acid. A great deal of lime is thus extracted. The trains are stopped by a chain brake, operated by a massive wheel in the guard's compartment in the rear car.

Mersey Tunnel.—This railway deserves special mention on account of the enormous locomotives used. These have inside cylinders, six driving-wheels and a four-wheel truck behind. The water tanks are at the sides, and over the truck. The dimensions of "No 1" are: Driving-wheels, 4 ft. 7 in.; cylinders, 21 × 26 in.; weight in working order, 152,012 lbs. Of this weight, 115,556 lbs. are on the drivers, and, with a steam pressure of 150 lbs., these are some of the most powerful locomotives in the world.

Locomotive Builders.—There are a number of firms that supply locomotives by contract. Most railways build their own locomotives, but frequently, when their shops are overcrowded, orders are given to builders. Most of the firms, however, supply other machinery as well, so that there are no works like the Baldwin Locomotive Works. Orders for locomotives come usually from the colonies and railroad contractors. Locomotive works are located in Leeds, Manchester, Newcastle, Glasgow, etc. The works of Robert Stephenson & Co. are in Newcastle. This firm, besides making locomotives, does considerable marine engine building. The plant is built around the original shop where the "Rocket" was made.

Japan as a British Market.

Twenty years ago, when railways were commenced in Japan, everybody connected with them was British, from the director and chief engineer down to the firemen, but now, although as many miles are now built in one year as it formerly took half a dozen to get through, practically everything in the way of construction and direction is done by the Japanese, without foreign assistance, and the number of foreign employés is very small. The engines, rolling stock, rails and bridges are for the most part imported from England, and this is likely to continue for a very considerable time, as the production of iron and steel from Japanese ores is much more expensive than from European.

We think, therefore, that for many years to come Japan will afford a good market for our heavier manufactures in iron and steel, and for machine tools of various kinds.

The telegraph system of Japan is now one of the most complete in the world, and is practically independent of foreign assistance. The highly trained students of the various colleges have developed into good telegraph engineers, who are able to stand their own with even the best foreign experts, as is clearly shown by the parts they have taken in the various international congresses which have been held for the discussion of telegraph matters. Moreover, they have not by any means confined themselves to the telegraph side of their profession. Electric lighting is much more common in Tokio than it is in many of our large towns, and the Japanese have not only taken advantage of all the progress which has been made in Europe and America, but they think, and not without reason, that they have been able to make some developments of their own in that way.

The mines of Japan are capable of a very great development. A few of these are practically under the control of foreign engineers; but much progress is not likely to be made till foreign capital has greater inducements for investment than it has at present, and this cannot take place until the treaties are revised.

For some time past there has been quite a "boom" in Japan in the floating of limited liability companies for industrial purposes. No doubt there has been, along with this, a considerable amount of speculation; but many of the concerns have been founded on a sound basis, and are now making good returns for the money invested in them. All sorts of industries have thus been started, especially those connected with chemical manufactures, weaving and spinning, and the articles required for domestic use. The greater part of the plant required for these has gone out from this country and the continent of Europe; but it must be evident that in a comparatively short time Japan will make herself practically self-contained, as indeed she was before the period when foreigners settled on her shores in any large numbers, which is not much more than a generation ago. Japan is ambitious of becoming the Britain of the East, and is therefore anxious to have a good navy and a large mercantile marine. For the same reasons which will compel her to buy her railway materials abroad, she must for many years to come purchase her ships and engines in foreign countries, and Britain must exert herself to obtain a fair share of these. Hitherto she has had the largest share, but others are now beginning to compete with us, and it may be found that in the future it will not only be more difficult to obtain orders, but further that work must be executed with a smaller margin of profit.

The conclusion at which we arrived with regard to China may be repeated with regard to Japan—that is, that we fear there is but a slender prospect of finding in Japan a constantly growing market for our manufactured goods, or an unlimited field in which our young engineers may obtain congenial and lucrative employment for many years to come. As a market for machinery, Japan will probably long continue to be of great importance to British manufacturers; but in other matters we cannot hope for much improvement on the state of things now existing.—*Industries.*

TECHNICAL.

Locomotive Building.

The Northern Pacific has placed an order for 76 locomotives with the Baldwin works.

The Baltimore & Ohio has placed an order for 12 with the Baldwin works and 12 with the Pittsburgh Locomotive and Car Works.

The Richmond & Danville has ordered three passenger engines of the Pittsburgh works.

The Central of Georgia has ordered 20 locomotives of the Dickson Manufacturing Co., of Scranton, Pa.

The Alabama Great Southern this week received three new mogul engines from the Baldwin Locomotive Works, of Philadelphia.

A new locomotive was completed last week at the Manchester Locomotive Works for the Atchison, Topeka & Santa Fe.

The Rhode Island Locomotive Works has commenced delivering eight-wheel engines, with 18 × 24 cylinders, to the New York, New Haven & Hartford, which recently placed an order for 10 of them with these works.

Car Notes.

There are now about 600 cars in service fitted with the Bosmann ice tank. The Atchison, Topeka & Santa Fe has 200, the Kansas City, Fort Scott & Memphis 100, and 63 are run on the Illinois Central. In addition to this, 200 cars have just been completed by the La Fayette Car Works for the Louisville, New Albany & Chicago, and 25 with these improvements have been built for the Ohio & Mississippi.

The Indianapolis Car Manufacturing Co. has been awarded the contract to build 500 box cars for the Cincinnati, Jackson & Mackinaw road.

The Louisville & Nashville has divided its contract for 500 more fruit cars, giving 200 of them to the Ohio Falls Car Works, at Jeffersonville, Ind., and 300 to the Missouri Car & Foundry Co., at St. Louis.

It is stated that the Canadian Pacific will establish large car works in Maine at a point on its line through that state.

The Brooklyn, Bath & West end road has received ten new open cars for summer excursion travel.

The Philadelphia & Reading is said to have placed orders for 250 additional twin hopper, gondola cars of a capacity of 25 tons each. Five hundred cars of this kind are now being delivered.

The Southern Pacific shops at Sacramento have just turned out a handsome new private car for President Leland Stanford.

Bridge Notes.

The Board of Supervisors of Hinds County, Miss., ask for bids for erecting an iron bridge across Pear River, near Jackson.

The Bristol County Commissioners have decided to build a new bridge across the Acushnet River, at New Bedford, Mass.

The Anniston & Montgomery has let the contract for the construction of an iron bridge, 725 ft. long, over the Tallapoosa River to the Atlanta Bridge & Axle Co., of Atlanta, Ga.

The Vermont Construction Co., of St. Albans, is building a new iron bridge at Readsboro, Vt., which is to be 300 ft. long, of three spans.

The La Fayette Bridge Co. has been awarded the contract for building the Main street bridge at La Fayette, Ind. The contract price is $36,340. There were twelve bidders for the work.

The Board of Freeholders are to have built this summer an iron drawbridge over the Elizabeth River in Elizabeth, N. J.

The Milwaukee Bridge Co. is building a new bridge over the Sioux River at Canton, Dak.

The Berlin Bridge Co. is building two iron bridges at Highland Falls, N. Y.

The Berlin Bridge Co., of East Berlin, Conn., will build the iron bridges on the extension of the Somerset road to Bingham, Me.

The Keystone Bridge Co. has orders for 10,000 tons of work in hand, which will keep the plant busy until next fall. Altogether the works will turn out 17,000 tons of structural iron this year, which is 2,000 tons more than ever before in the same time.

Proposals were opened June 17 by the Commissioners of Hampden and Hampshire Counties for building the superstructure of a bridge over the Connecticut River at Holyoke, Mass., from designs by Edward S. Shaw, of Boston: The following bids were received: New Jersey Steel & Iron Co., Trenton, N. J., $123,000; Hilton Bridge Co., Albany, N. Y., $125,800; R. F. Hawkins, Springfield, Mass., $127,000; Rochester Bridge Works, Rochester, N. Y., $128,490; Wallis Iron Works, Jersey City, N. J., $128,781; King Iron Bridge Co., Cleveland, O., $131,000; Groton Bridge Co., Croton, N. Y., $134,975; Boston Bridge Works, Boston, Mass., $134,990; Wrought Iron Bridge Co., Canton, O., $138,000; Philadelphia Bridge Works, Pottstown, Pa., $138,890; Vermont Construction Co., St. Albans, Vt., $140,000; Columbia Bridge Co., Dayton, O., $144,000; Pittsburgh Bridge Co., Pittsburgh, Pa., $145,000; Wisconsin Bridge Co., Wauwatoosa, Wis., $163,250; Variety Iron Works, Cleveland, O., $177,477. The contract was awarded to the New Jersey Steel & Iron Co.

Manufacturing and Business.

Messrs. J. & H. Taylor, dealers in railroad and engineers' supplies in Montreal and Quebec, have made an assignment with liabilities of about $135,000.

The Northwestern Car Seal Co. has been incorporated in Minnesota by H. R. Williams of Kansas City, F. W. Kimball of Milwaukee, L. A. Foote of Lansing and L. Hurlburt of Austin. The company control a large number of patents, and already supply some of the large Western lines. The plant is to be removed to Austin.

Wm. Tod & Co., of Youngstown, O., are building a blowing engine for the Shenandoah Furnace Company, of Milnes, Va., of a new design, having positive valve gear, and such an arrangement of air valves as to reduce the air clearance below 2 per cent.

Mr. Carl Binder, C. E., until lately Bridge Engineer of the Lake Shore & Michigan Southern, has established a bridge engineering office at the Lakeside Building, Chicago. He makes a specialty of difficult foundations, long spans, drawbridges, etc., and is prepared to examine, furnish plans and estimates and superintend construction.

The Universal Electric Railway Signal Co. has been incorporated at Richmond, Va., with Robert G. Cabell, Jr., President, and James R. Branch Secretary, to manufacture electric railroad signals.

The Manchester (N. H.) Locomotive Works are building a new self-propelling fire engine for the city of Hartford. It has a 40-in. boiler, with 5½-in. double water cylinders, and double steam cylinders, 9½ in. in diameter. The company is also building engines for Pittsburgh, Pa.; Washington Steam Fire Engine Co., Wilmington, Del.; Lawrence, Mass.; Provincetown, Mass., and other points in this country, besides one for Lima, Peru.

The Thomson-Houston Electric Co. reports sales of 1,015 arc, 3,200 incandescent and 1,000 alternating current lights. This includes orders from Boston, Springfield, Mass., Philadelphia, Minneapolis and other large cities. The company also reports sales of 1,425 incandescent lights for isolated plants.

A contractor working in hard rock in New York City with a No. 4 Little Giant Rand rock drill, recently drilled 25 holes in ten hours, each hole being 5¼ ft. deep and 2¼ in. diam. at the bottom, making thus a total of 137½ ft.

Iron and Steel.

Singer, Nimick & Co. are putting in a Boulton apparatus for making solid steel ingots, manufactured by the Solid Ingot Co., of Newark, N. J.

The Bristol Foundry & Machine Co., of Bristol, Tenn., has just filled a 60,000-lb. order for the South Atlantic & Ohio road.

Every department of the Pennsylvania Steel Works at Steelton, Pa., started up June 17. Sufficient orders are in hand to keep the works running day and night for several months at least for nail plates and billets. The usual shut down on July 1 for repairs will not take place this year, as all the repairs necessary were made in the past two weeks

The assignee will sell the real estate, blast furnaces, patents and other property of the Nashville Iron, Steel & Charcoal Co. at Nashville, Tenn., July 2. Included in the property are two blast furnaces, 12 ft. bosh and 60 ft. high; four hot-blast stoves, 16 by 55 ft.; four independent Babcock & Wilcox boilers, with 5,516 square ft. of heating surface; four additional two-flue, 40 ft. by 50 in. 18-in. flue boilers, new, made by Erie City Iron Works; two 84 by 48-in. blowing engines, with 36-in. steam cylinders. The mortgages on the property amount to $150,000.

Furnace No. 5 of the Cambria Iron Co., at Johnstown, Pa., has been put in blast. Superintendent Price is quoted as saying that they will be working full in the steel works, blooming mill, No 2 rail mill, the nine-inch mill and merchants' mill by July 1. The damages to the buildings during the flood was great, but the machinery was only slightly injured. The blast furnaces were hurt little, and will be in operation as soon as a supply of coke can be obtained. Vice-President Powell Stockhouse is reported as saying that in another week the entire works, employing fully 6,000 men, will be in operation, and that before July 4 everything will be going all right. It is said that about 2,000 of the employés are missing, but that their places are nearly all filled. The total loss of the company is much less than the estimates first published, the aggregate being now stated at $300,000.

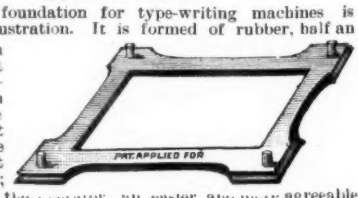
The Rail Market.

Steel Rails.—Several small orders have been placed in the East, the largest lot being for 3,000 tons. The mills are well supplied with orders, and early deliveries are difficult to secure. In the West little business is reported. The quotations at New York are $28 for heavy sections, $27.50 being given for large orders; at Chicago they are $29@$30 for heavy sections. At Pittsburg the market is firm with quotations at $26@$27.

Old Rails.—The market is firm, with holders waiting for higher prices. Old iron rails are in good demand, and inquiries have been made for old steel rails, but no sales are reported. In Chicago $20.50 and $23 is asked, with bids at $20.25.

Type-writer Mat.

An excellent foundation for type-writing machines is shown in the illustration. It is formed of rubber, half an inch thick, with lugs which fit into corresponding recesses in the base of the machine. It deadens all noise due to contact with the desk; produces, for the operator, an easier and more agreeable touch; and it is a plausible claim that it materially prolongs the life of the machine. It is made in shapes and sizes to fit all varieties of type-writing machines, and is a simple and inexpensive addition to the machines in use in all railroad offices. It is made by the United Rubber Co., Trenton, N. J.



New Cruisers to be Built.

The Navy Department has issued advertisements inviting proposals for the construction of two steel cruisers of 3,000 tons displacement. The contractor is required to guarantee a minimum speed of 19 knots for four consecutive hours, and there is a bonus provided of $50,000 for every additional quarter-knot, and a deduction of the same amount for each quarter-knot deficiency. The vessels are to be completed in two years, and exclusive of the speed bonus, their cost is not to exceed $1,800,000 each. The contractors are allowed to bid for the construction of the hull and machinery, according to their own designs, or to accept those furnished by the Department. The proposals are to be opened Aug. 22, and the time for the receipt of proposals for building the three 2,000-ton cruisers has also been extended from Aug. 1 to the same date. The new vessels will be about as large as the "Atlanta," but will be much more formidable craft, better armed and of higher speed. They are patterned generally upon the "Medea," an English cruiser of great speed and combining many good qualities. They will be larger, however, by 100 tons, and embody many improvements suggested by the working experience of the "Medea." The dimensions of the vessels will be as follows: Length, 300 ft.; breadth, 42 ft.; draught, 18 ft.; displacement, 3,100 tons; full coal capacity, 628 tons. The armament will consist of one 6-in. and ten 4-in. rapid fire guns and eight machine guns. The ships will be two masted schooner rigged, but will carry sail enough only to steady them in a sea way.

A New Transportation Scheme.

General Imboden proposes to the *Tradesman* (Chattanooga), that the coking coals of Southwestern Virginia shall be utilized, and this use extended by getting the furnacemen of Tennessee, Georgia and Alabama to form a great coking company among themselves, and buy 20,000 to 30,000 acres of coal lands as near as possible to the waters that flow into the Powell and Clinch Rivers, and build a road from King-

ston, Tenn., the head of good steamboat navigation on the Tennessee, up the river with branches to all of the coking towns which are to be formed about the mines so bought.

General Imboden says that a 60-ton mogul would, as there would be no adverse grades, haul 3,000 tons of coke to Kingston and haul the empties back, a somewhat extravagant estimate. At Kingston the loaded cars would be taken off their trucks by a derrick and placed on a barge. The barges should carry six bodies, and that a tug could take ten of these barges down the river, which, on the completion of the "Mussel shoals" improvement, would be open to St. Paul or New Orleans. When the barges arrived at their destination the cars could be lifted off and either placed on other trucks for delivery at points away from the river side or be unloaded. The general contends that this combined system of transportation could be conducted at a cost, with fair profit, of two mills per ton mile.

It might be suggested that the proposed combination of coke crates, *i.. e.*, car bodies, and trucks might not always work without demurrage and cognate evils, and that an estimate on the advantages and disadvantages of coking the coal at Kingston would be advisable. As, in general, it takes 1.6 tons of coal to make a ton of coke, the train load would net but about 2,000 tons of coke; but, on the other hand, the coke could go directly into the barges, and it seems probable that the great amount of gas now wasted in coke making might be utilized if there was a concentration of coke ovens at the head of a navigation as extensive as that of the Tennessee, in combination with the other streams of the Mississippi Valley.

The Improvement of the River Main and of the Kanawha.

At a meeting of the Institution of Civil Engineers Mr. Vernon-Harcourt read a paper on canal and river work in France, Belgium and Germany, in which, and in the subsequent discussion, some interesting facts regarding the crevization of the River Main were brought out, bearing, as they did, on the contention of the Continental engineers that an improvement of waterways is helpful to railroads.

The river traffic of Frankfort, which in 1840 was 492,000 tons, fell, according to Mr. Kidd, to 10,000 tons through the superior facilities offered by railroads. In 1883 it was determined to increase the minimum depth of the river, from less than three to 6½ ft. by means of five dams, each of which had a raft run, 39½ ft. wide, provided with drum wiers; high water wiers, with needles, on the Poirée system, and locks 246 ft. long and 34½ ft. broad, which, in expectation of a future increase in the navigable depth, had 8¼ ft. of water on their sills. This gave a mean rise of 35½ ft. for the 22 miles from the Rhine to Frankfort and was available for vessels of from 700 to 1,000 tons.

The work was completed in three and a half years at a cost of $1,336,500 or a yearly expenditure of $382,000. As a matter of contrast work was commenced on the improvement of 76 miles of the Kanawha River, West Virginia, in 1875. Twenty-two miles are now improved to a minimum depth of 6 ft., at a cost of $1,833,144, or an average annual expenditure of $141,000, and supposing that in each case the expenditures were uniformly distributed, the interest account on the Main amounted to about 10 per cent. of the cost at the completion of the work, while on the Kanawha it is already 50 per cent. of the expenditure. The estimated tonnage on the Main last year was 500,000 tons and on the Kanawha the tonnage exceeded 900,000 tons.

Now, according to Mr. Lindley, the engineer of the works, the traffic on the river is seventy-threefold what it was in the last years before the opening of the new works, and the government has decided to increase the depth to 8¼ ft., to extend the locks to a length of 1,165 ft. each, so that two trains of four of the largest boats each could be locked through at one time, and to carry out various further improvements and extensions to meet the constantly increasing demands.

Mr. Vernon Harcourt sums up the results of the improvement as follows: "This wonderful rise in the river traffic is the more satisfactory as it is not due to a diversion of trade from the railways to the river, brought about by the expenditure of public money for which no charges are levied, for the railways have also shared in the increase of traffic. Thus the increase of traffic on the river has been accompanied by an augmentation of 36 per cent. in the railway traffic, showing that, under certain conditions, the improvement of inland waterways, even when in a position to enter into competition with railways may so develop the trade of a district that the railways largely benefit by the increase of prosperity effected by their apparent rivals." And in this connection it might be noted that the shipments of coal by the Kanawha River for 1888 showed an increase over the average for the preceding three years of 303 per cent. while the shipments by rail increased by 133 per cent.

Consolidation of Car Heating Companies.

The McElroy Car Heating Co. and the Sewall Safety Car Heating Co. have consolidated under the name of the National Car Heating Co. The new company has bought all the patents and the good will of the other companies. Mr. Robert C. Pruyn, President National Commercial Bank, Albany, is President· Mr. D. D. Sewall, General Manager, and Mr. J. F. McElroy, Mechanical Superintendent. The principal office and works will be at Albany, N. Y., other offices Portland, Me., New York City and Chicago.

RAILROAD LAW—NOTES OF DECISOINS.

Powers, Liabilities and Regulation of Railroads.

The Supreme Court of Indiana holds that where one railroad company goes entirely out of existence by being consolidated with another, if no arrangements are made respecting the property and liabilities of the first company, the new company will succeed to all the property and be answerable for all the liabilities.[1]

The Railroad Consolidation act of New York of 1869 provides that actions pending against either of the consolidating companies shall not abate, but may be conducted to final judgment in the name of the existing corporation, and that the rights of all creditors shall be preserved unimpaired, and the respective corporations shall be deemed to continue in existence to preserve the same. The Supreme Court rules that an action can be brought after consolidation against one of the consolidating companies on its bonds previously executed.[2]

The Supreme Court of Washington Territory holds that a statute providing that when stock is killed on a railroad the value shall be ascertained by appraisers in a prescribed manner, and the amount shall thereupon become due and payable, is unconstitutional as denying the right of jury trial.[3]

In Kentucky the Court of Appeals holds that where a railroad company, to whose stock a county is a subscriber, becomes insolvent after partly constructing its road, and the road is sold, and the purchaser completes its construction, the entire property in said county becomes subject to taxation, except the value of that part that was acquired by the purchase, and in estimating that value the amount expended by the old company is not the criterion of its value at the time of the sale, but the difference in cost of construction, decay of trestles, abutments, etc., and damages to embankments by rains are to be considered.[4]

A statute of Texas provides that on the sale of the roadbed, track, franchise and chartered rights of a railroad company, the purchasers shall be deemed the true owners of the charter, and corporators under the same, "and vested with all the powers, rights, privileges and benefits thereof, in the same manner and to the same extent as if they were the original corporators." The Supreme Court decides that the sale under execution of the property and franchises of a railway corporation did not destroy its corporate existence, and that the purchaser was not liable on a pre-existing contract by the former owner with plaintiff to maintain a depot at a certain place.[5]

The Supreme Court of Pennsylvania decides that the statute of 1868 limiting the amount of recovery against common carriers for negligence to $3,000 in cases of personal injuries, and $5,000 in cases of death, and providing that, "upon the acceptance of the provisions hereof by any carrier or corporation, the same shall become a part of its act of incorporation," does not constitute a contract between the state and an accepting railroad company, having a previously granted charter, and whose road was not constructed, nor money expended, on the faith of it. It is simply the grant of a new franchise, which may be taken away by repeal, as is done by the new constitution.[6]

In Illinois the Court of Appeal holds that one who is president and member of the executive committee of a railroad company, and managing agent of the construction company that is building the road, and acts in both capacities according to his will and judgment in the construction, is liable for a trespass committed by a sub-contractor.[7]

Carriage of Goods and Injuries to Property.

In Georgia a railroad agreed to carry a lot of goods for plaintiffs to the terminus of its line; after they had been shipped in car-load lots plaintiffs requested defendant's agent at its terminus to have the goods transferred in the same cars to the road of the connecting carrier, to be by it carried to their destination, which request was refused. The Supreme Court rules that, as the defendant had completed its contract, the petition showed no breach of a contract at the terminus of the road that would give the court of that county jurisdiction of an action.[8]

The Supreme Court of North Carolina holds that a clause in a bill of lading by which the carrier has a lien upon goods shipped for all arrearages of freight and charges due by the owners or consignees on other goods will not enable the carrier to hold the goods on account of freight due from the vendee on preceding shipments, to the prejudice of the vendor's right of stoppage *in transitu*.[9]

In Georgia the Supreme Court rules that to recover damages for mere delay in performing the contract of carriage, the value of such goods at the place of destination when they ought to have arrived should appear, and also their value when they did arrive; the difference between these values being generally the measure of damages. And to show when they ought to have arrived, the contract being silent, it should appear what length of time was usually required or was reasonably necessary to effect the transit.[10]

In Texas the Federal Court holds that a claim by the consignee of goods against a railroad company as a common carrier, for the value of goods lost by fire while in possession of the carrier, and before the road is placed in the hands of a receiver in a foreclosure suit, is not entitled to a priority before the claims of the bondholders.[11]

The Supreme Court of Alabama decides that a stipulation in a bill of lading that the carrier will not be "liable for damages (either from fire or other cause) as common carriers for any article after it has been transported to its place of destination, and been placed in the depot of the company," is valid, and, upon the storage of the goods in the depot at their destination, the carrier's responsibility as carrier ceases.[12]

In Virginia, in an action for damages by fire from a passing locomotive, experts testified for defendant that the engine which passed was new, of the best make, and with the best appliances; that the spark-arrester was the best in use, and in perfect order. Several witnesses testified that the fire did not start on defendant's right of way, and that there were no combustible substances thereon; plaintiff's witnesses, who saw the fire, did not contradict these, and some witnesses, including two of plaintiff's, testified that the fire started on adjoining land in a cluster of bushes. The Supreme Court of Appeals rules that the railroad is not liable.[13]

In Michigan the complainant owned a 40-acre tract of land and the railroad took possession for its road of four acres of it, being a strip running diagonally across the tract, and separating 14 acres from the rest, having it without means of access from any direction, except by crossing the railroad. In estimating the damages, the jury seemed to regard the land as valvable only for farming purposes and allowed for the four acres actually taken only about one-tenth of the value of the entire 40. Nothing was allowed for the injury resulting from cutting off the 14 acres from the rest of the tract, nor was any allowance made for the length of time the company had been in possession. The Supreme Court sets the award aside.[14]

In Pennsylvania the Supreme Court decides that the owner of land over which a railroad has been located may remain in possession and plant crops after such location and before bond given, or notice by the railroad company of the time when actual possession will be required; and crops so planted are proper subjects for compensation, and where the owner makes a lease after such location, and the lessee plants crops before bond or notice by the company, the lessee is entitled to damages for injury to his crops, and the company cannot avoid its liability to him by payment of damages to the lessor after the lessee has taken possession and planted the crops.[15]

Injuries to Passengers, Employes and Strangers.

In Texas a passenger inquired of the conductor how long the train would stop at the next station, and the conductor answered "five minutes." When the train arrived there the passenger, who wanted to post a letter, alighted, but he had barely entered the depot when he saw the train starting. In trying to board it he fell and was injured. The Supreme Court rules that he has no cause of action against the company; that the conductor's answer to his question gave him no rights. The Court says: "If the plaintiff had made known to the conductor his desire to stop at the station, and the conductor had expressly or impliedly promised him to wait five minutes; or if the conductor, upon his asking the question, told him that the train would stop a designated time, and the conductor subsequently knew that he had left the train, and moved it without giving him time to re-enter the car, the plaintiff would have had a different case. The contract of a railroad company with a passenger is to carry him to his point of destination. He is not expected to leave the cars at intermediate stations, and the carrier does not engage to afford him an opportunity to do so, except at the usual stopping places for refreshments. It follows, we think, that when a conductor is merely asked how long a train will stop at a certain station, he is not presumed to know that it is the desire of the inquirer to alight and to consume the time of the halt on business away from the cars. Such questions are frequently asked by passengers from idle curiosity or other motives, and it would be unreasonable to hold that, by answering them, the conductor assumes for the company the obligation to watch the movements of the passenger or unnecessarily to delay the train in accordance with his answer."[16]

In New York a passenger attempted by direction of the conductor to board a moving train on a front platform at a station where the train was advertised to stop. The depot platform was uneven, the train was going about eight miles an hour and be sustained fatal injuries. The Court of Appeals holds that there can be no recovery from the railroad.[17]

In Mississippi the Supreme Court decides that if a passenger sell or dispose of a non-transferable ticket, and is unable to exhibit it within a reasonable time after request, and refuse to pay fare for the balance of the trip, and is required, without abuse or unnecessary force, to leave the train, he cannot recover. But the fact that a son over 21 years of age has sold a non-transferable ticket while using it on a trip does not justify ordering his father, who is accompanying him, to leave the train, or ejecting the father.[18]

In Georgia the plaintiff's husband was an employé on a construction train. The construction train was in a deep cut. A cow was seen near the track, and immediately the brakes were applied, and the speed of the train was diminished to 6 miles an hour. Suddenly, after the cow had crossed the track, another jumped on the track just as the forward car reached the crossing. It was not seen, and could not have been seen, till it started across the track, and the train could not have been stopped after it was discovered. The car struck the cow, and was derailed, and plaintiff's husband was killed. The Supreme Court decides that the company was not in fault and not liable.[19]

In Texas the plaintiff was a fireman on an engine in a switchyard, and while getting upon the tender he caught hold of a hand-hold on it, which, being insecurely fixed, gave way, and he fell to the track and was run over. The engine and tender were moving at the rate of about two miles an hour, the tender in front. There was a step at the cab on the engine intended for the engineer and fireman to get off and on the engine. The Supreme Court holds that plaintiff, in imprudently mounting the tender at the end approaching him, contrary to the orders of the company, and in failing to wait until the cab-step came opposite to him, where he could have entered with safety at the entrance made for his use, was guilty of such contributory negligence as to defeat his right to recover against the railroad.[20]

In Ohio the Federal Court rules that a railroad, having established at a street crossing a gate under the care of a flagman, is bound to close the gate when its cars are passing over the crossing, to give a reasonable warning by whistle or bell, and to pass the crossing at a reasonably safe speed. When a gate established by a railroad company at a street crossing is open, a street-car driver may assume that the track is clear and safe, and is not negligent for passing through the gate without stopping to look or listen for a train. Nor is it negligence, after passing the gate, to stop and look and listen before crossing the track, if ordinary prudence or care be exercised to cross the track and avoid injury.[21]

In Texas an old and deaf man was walking on the track of a railroad and was struck by a train. It did not appear that his deafness was known to those operating the train. There was nothing to prevent him from seeing approaching trains for a long distance. The train consisted of about 20 cars in advance of the locomotive. There was a lookout on the foremost car, who, when he saw that the man did not leave the track, gave the signal to stop the train, but before the cars could be stopped they ran over him. The Supreme Court rules that the railroad is not liable.[22]

The Supreme Court of Missouri decides that the failure of railroad employés to ring the bell or sound the whistle when approaching a railroad crossing, as required by statute, comes within the clause of the state statute, imposing a penalty on a railroad company for a death resulting from negligence, unskillfulness, etc., of the servant while running locomotives, etc. But the second clause of the section, making the company liable for the death of "any passenger" caused by a defect in the railroad, does not include the death of one driving over the crossing.[23]

1 Louisville, N. A. & C. R. Co. v. Beney, 20 N. E. Rep., 432.
2 Gale v. T. & B. R. Co., 4 N. Y. (Supp.), 295.
3 Dacres v. O. R. & Nav. Co., 20 Pac. Rep., 601.
4 Owensboro & N. R. Co. v. Logan Co., 11 S. W. Rep., 77.
5 Gulf, C. & S. F. R. Co. v. Newell, 11 S. W. Rep., 342.
6 Penn. R. Co. v. Bowers, 16 Atl. Rep., 836.
7 St. Louis R. Co. v. Drennan, 26 Ill. (App.), 263.
8 Coles v. Cent. R. & B. Co., 9 S. E. Rep., 127.
9 Farrell v. Richmond & D. R. Co., 9 S. E. Rep., 302.
10 Atlanta & W. P. R. Co. v. Texas Grate Co., 9 S. E. Rep., 600.
11 Easton v. H & T. C. R. Co., 38 Fed. Rep., 12.
12 West. R. Co. v. Little, 5 South. Rep., 563.
13 Bernard v. R. F. & P. R. Co., 8 S. E. Rep., 785.
14 Grand Rapids, L. & D. R. Co. v. Cheseboro, 41 N. W. Rep. 66.
15 Lafferty v. S. R., E. S. R. Co., 16 Atl. Rep., 869.
16 Mo. Pac. R. Co. v. Forrman, 11 S. W. Rep., 326.
17 Hunter v. Cooperstown & S. V. R. Co., 19 N. E. Rep., 820.
18 L. & N. R. Co., v. Mayben, 5 South. Rep., 401.
19 Prather v. Richmond & D. R. Co., 9 S. E. Rep., 530.
20 Murray v. Gulf, C. & S. F. R. Co., 11 S. W. Rep., 125.
21 Whelan v. N. Y., L. E. & W. R. Co., 38 Fed. Rep., 15.
22 Artusy v. Mo. Pac. R. Co., 18 S. W. Rep., 177.
23 Crumpley v. H. & St. Joe R. Co., 11 S. W. Rep., 244.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Lowell, 3½ per cent., payable July 1.
Boston, Revere Beach & Lynn, 3½ per cent., payable July 1.
Cleveland & Mahoning Valley, quarterly, 3½ per cent., payable July 1.
Connecticut River, quarterly, 2 per cent., payable July 1.
Eastern in New Hampshire, 2¼ per cent., payable June 15.
Lehigh Valley, quarterly, 1¼ per cent., payable July 15.
Lowell & Andover, 3½ per cent., payable June 6.
Manhattan Elevated, quarterly, 1¼ per cent., payable July 1 in bond certificates.
Missouri Pacific, quarterly, 1 per cent., payable July 15.
Nashville, Chattanooga & St. Louis, 1¼ per cent., payable July 10.
Northern Central, semi-annual, 3 per cent., payable July 15.
Old Colony, 3½ per cent., payable July 1.
Tyrone & Clearfield, 2¼ per cent., payable June 30.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car-Builders' Association* will hold its next annual convention at Saratoga Springs, N. Y., June 25. Hotel accommodations may be secured by applying to H. S. Clement, Manager Congress Hall.

The *International Association of Car Accountants* will hold its fourteenth annual meeting at Plank's Grand Hotel, Island of Mackinaw, Mich., June 25.

The *Traveling Passenger Agents' Association* will hold its next meeting in Plank's Hotel, Mackinac Island, Mich., July 9.

The *Association of American Railway Accounting Officers* will hold its next meeting at Niagara Falls, N. Y., July 10.

The *National Association of General Baggage Agents* will hold its next meeting at Detroit, Mich., July 17.

The *New England Roadmasters' Association* will hold its next meeting in Boston, August 21.

The *Roadmasters' Association of America* will hold its seventh annual convention at Denver, Colo., Sept 10.

The *American Association of General Passenger and Ticket Agents* will hold its next semi-annual meeting in Atlanta, Ga., Sept. 17.

The *Master Car Painters' Association* will hold its next annual convention in Chicago in September.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month, except June, July and August. The next meeting will be held Sept. 11.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meeting on the first and third Wednesday in each month at the House of the Society 127 East Twenty-third street New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p.m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at the Club rooms, No. 24 West Fourth street, Cincinnati, at 8 p. m., on the fourth Thursday of each month.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p m., on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

American Institute of Electrical Engineers.

The 36th meeting of the Institute will be held in the lecture room of Prof. R. Ogden Doremus, at the College of the City of New York, No. 17 Lexington avenue, southeast corner of 23d street, June 25, at 8 o'clock p. m.

Mr. Leo Daft, member, will read a paper entitled "Some Recent Electrical Work on the New York Elevated Railroads and its Bearing on the Rapid Transit Problem."

The date of this meeting was announced as June 18, but has been postponed on account of delay in preparing the diagrams.

American Society of Civil Engineers.

The titles of the papers to be presented at the annual convention at Seabright, N. J., convention of 1889, which commenced its sessions at Seabright, N. J., June 20, were published in these columns June 7, page 381, but the Preliminary Provisional Programme gives the date when it is expected the papers and reports will be presented. On Friday the papers and discussions will be on Structures; on Saturday they will be on Water Supply, Dams and Reservoirs; on Monday the business meeting will be held, and the papers and discussions will be on Ship Canals, Mississippi River Flood Heights, Influence of Temperature, Highway Improvements, etc. The banquet will occur Monday evening. On Tuesday and Wednesday the papers and discussions will be on Railroads, Rails and Wheels, including report of committee on relation of rails and wheels, and a paper by Mr. Wm. Barclay Parsons on the Railways of Mexico.

Train-Dispatchers' Association.

The National Association of Train-Dispatchers met in Indianapolis June 13 and 14. The officers for the ensuing year are: President, A. A. Zion, Indianapolis; Vice-President, J. F. Branton, Wilmar, Minn.; Secretary, E. J. Peabody, Chicago. Executive Committee: W. H. Graves, Winona, Minn; W. W. Polk, Water Valley, Miss.; George B. Fair-Fairbanks, Tulare, Cal.; John Reilly, Smith Falls, Ont.

PERSONAL.

—Chief Engineer Robert Van Buren of the City Works Department of Brooklyn, N. Y., has resigned.

—Mr. E. B. Guthrie, Secretary and Car Accountant of the Chicago & Atlantic, has resigned those positions.

—Mr. George Tozzer, Purchasing Agent of the Cincinnati Indianapolis, St. Louis & Chicago, has tendered his resignation, to take effect July 1.

—Mr. William Semple, of Allegheny City, Pa., one of the directors and a large stockholder in the Pittsburgh & Western, died in that city June 14.

—General Superintendent H. F. Royce, of the Chicago, Rock Island & Pacific, was married in Des Moines, Ia., June 12, to Mrs. Ella Echelberger.

—Mr. William W. Wright, a director of the Geneva, Ithaca & Sayre road, of the Buffalo & Geneva, and of other companies, died in Geneva, N. Y., June 12, at the age of 76.

—Mr. Edward Dickinson, Assistant General Manager of the Union Pacific, has informed the South Omaha Stock Yards Co. that he will not accept the position of General Manager of that organization tendered him several weeks ago.

—Mr. George C. Watrous, Superintendent of Rolling Stock and Motive Power of the Detroit, Lansing & Northern and Chicago & West Michigan roads, died at Ionia, Mich., recently. He was 58 years old, and had been in the railroad service since 1851.

—Mr. Andrew A Allen, General Superintendent of the Wisconsin Central, has been chosen General Manager of the Chicago & Great Western, which controls the Wisconsin Central terminals in Chicago. Mr. Allen has been connected with the Wisconsin Central since 1882, when he entered its service as Division Superintendent.

—Mr. S. R. Ainslee, General Superintendent of the Northern Pacific, has been chosen General Manager of the Wisconsin Central Co., to succeed W. S. Mellen, who becomes General Manager of the Northern Pacific. Mr. Ainslee was appointed Division Superintendent of the Northern Pacific in May, 1882. He was previously to that General Superintendent of the Denver & Rio Grande for about two years.

—Mr. H. H. Collbran, who became Traffic Manager of the Colorado Midland last August, has been appointed Assistant General Manager of the same line. Previous to his service with the Colorado Midland he was General Freight and Passenger Agent of the Cincinnati, New Orleans & Texas Pacific and associate roads. He was born in London, Eng., in 1852. He came to this country in 1881, and was appointed General Freight and Passenger Agent of the Alabama Great Southern. He remained with the "Queen & Crescent" system until last August.

—Mr. Albert Fink, Commissioner of the Trunk Line Association, tendered his resignation this week and expects to leave for Europe July 10. Mr. Fink assigns his ill-health as the reason for his resignation, and it is understood that he will insist upon its acceptance at the meeting of the Presidents to be held next week. For several years past Mr. Fink has spent several months of the year in Europe, but he finds that the thought of taking up his duties again is a constant worry and anxiety, and prevents him from obtaining the complete rest which his health and years demand.

—Mr. Gaylord M. Beach, General Manager of the Cleveland, Columbus, Cincinnati & Indianapolis, Indianapolis & St. Louis and other lines in the system, has resigned these positions after serving with one or the other of the roads since 1857. This was continuous, with the exception of the last two months in 1870, when he was Division Roadmaster on the Atlantic & Pacific. Mr. Beach's first railroad service was as a track laborer. He has since been freight and passenger conductor, assistant roadmaster, roadmaster, real estate and tax agent, in charge of the engineering department of the Cleveland, Columbus, Cincinnati & Indianapolis, then Assistant General Manager and General Manager of the same road.

—President C. P. Huntington, of the Southern Pacific, has subscribed $50,000 to the fund being raised under the auspices of the King of Belgium for the construction of a railroad from the Falls of the Congo to Stanley Pool, Africa. The line is 262 miles long, and about $4,150,000 has been thus far subscribed, of which $2,000,000 was contributed by the Belgian government, and a similar amount by a syndicate of Belgian capitalists. Mr. McKinnon, the great Scotch shipbuilder, subscribed $100,000, and Mr. Huntington's connection with the project seems to be due to the relations existing between himself and Mr. McKinnon. He tells a reporter that his desire to see the slave trade abolished, rather than any business consideration, is his motive for investing in the African road.

—Mr. C. C. Waite, Vice-President and General Manager of the Cincinnati, Hamilton & Dayton, has retired from those positions. He has been Vice-President of the road since 1882, and since 1886 also General Manager. Mr. Waite has been in railroad service since 1864. He was first Assistant Engineer on an eastern road, and has since been Chief Engineer of the Columbus & Toledo, the Toledo, Akron & Atlantic and the Cincinnati & Muskingum Valley, serving also as Superintendent of this last road between 1870 and 1880. He then became Assistant to the President of the New York, Lake Erie & Western, which position he held until he joined the Cincinnati, Hamilton & Dayton. The directors adopted resolutions thanking Mr. Waite for his faithful and efficient services for the last seven years. "Assuming control of the property when it was non-dividend paying, he has by his skill and energy developed it into a profitable and successful corporation, with earnings in the past year greater than have been known on the main line for more than 20 years, and on the leased lines larger than ever before secured in their history."

ELECTIONS AND APPOINTMENTS.

Albion & Corydon.—Directors of this road, formerly the Louisville, New Albany & Corydon, were elected last week, as follows: H. H. Littell, St. John Boyle and John E. Green, Louisville; Alexander H. Davis, Syracuse, N. Y.; and M. J. O'Connor, R. J. Tracewell, and S. W. Applegate, Corydon. Mr. O'Connor was re-elected President.

Baltimore & Ohio.—George J. Lincoln has been appointed Assistant General Freight Agent of the Philadelphia division, to succeed James Colhoun, resigned to accept other service.

Walter Ancher has been appointed Supervisor of Steamers, Tugs and Barges, with headquarters at Baltimore, reporting to General Manager J. T. Odell.

Cairo, Vincennes & Chicago.—Norton Alexander has been appointed Superintendent, to succeed C. E. Doyle, resigned.

Canton Co.—At the annual meeting held in Baltimore, June 12, the old board of directors were re-elected as follows: George S. Brown, John S. Gilman, D. D. Mallory, L. W. Gunther, and W. B. Brooks of Baltimore, and James B. Colgate, William Mertens, John B. Probst, and William Bayliss of New York. W. B. Brooks was re-elected President, George S. Brown Vice-President, and William W. Janney, Secretary and Treasurer.

Catonsville Short Line.—The annual meeting of the road was held at Catonsville, Md., this week. The same board of directors was elected with James A. Gray, President, Eugene Carrington, Secretary, and the other officers.

Chesapeake & Ohio.—After July 1, General Manager J. T. Harahan will have charge of both freight and passenger traffic matters, as well as of transportion, and the freight and passenger departments will report to him instead of the President, as heretofore. Mr. Harrahan assumes the duties of Traffic Manager Oscar G. Murray, who resigns to go with the Cleveland, Cincinnati, Chicago & St. Louis. I. G. Rawn, Division Superintendent at Cincinnati, will succeed J. W. Sherwood as Superintendent of Transportation.

Chicago, Burlington & Northern.—At the annual meeting of the road the following directors were elected: Alex. Cochrane, J. Murray Forbes, Francis L. Higginson, W. Powell Mason, Edward C. Perkins, A. E. Touzalain and Charles L. Youngs.

Chicago, Kansas & Nebraska.—The annual meeting of the company was held in Topeka June 12. The Board of Directors elected is as follows: M. A. Low, H. A. Parker, C. F. Jilson, H. F. Morris, D Atwood, George W. Samuel and W. W. Phelps. The Board of Directors organized by electing M. A. Low, President, H. A. Parker, Vice President and Chief Engineer, and C. F. Jilson Secretary and Treasurer.

Cincinnati, Hamilton & Dayton.—The annual meeting was held in Cincinnati, O., June 18. The following directors were elected: Edward E. Cole, Marysville, O.; George W. Davis, Toledo; Julius Dexter and Eugene Zimmerman, Cincinnati; Sidney Dillon, Mahlon C. Martin, Russell Sage, Alfred Sully, New York; and M. D. Woodford, Toledo. The Board of Directors organized by electing the following officers: President, Julius Dexter; Vice-President, M. D. Woodford; Secretary and Treasurer, F. H. Short.

Cincinnati, Indianapolis, St. Louis & Chicago.—John Roberts, formerly Master Mechanic of the "Bee-line," at the Brightwood shops, is Acting Master Mechanic of the shops at Cincinnati, vice J. S. Patterson, resigned.

Cleveland, Cincinnati, Chicago & St. Louis.—The directors of the consolidated company elected last week are: Cornelius Vanderbilt, W. K. Vanderbilt, C. M. Depew, J. P. Morgan, G. Bliss, H. McK. Twombly, and J. D. Layng, of New York; S. J. Broadwell, A. McDonald, O. Smith, M. E. Ingalls, and W. P. Anderson, of Cincinnati; Amos Townsend and T. P. Handy, of Cleveland, and B. S. Brown, of Columbus. The directors chose the following officers: President, M. E. Ingalls; Vice-President, J. D. Layng; Secretary, E. F. Osborn; Treasurer, George S. Russell; Traffic Manager, O. G. Murray, who is to resign his position with the Chesapeake & Ohio; General Freight Agent, Edgar Hill; General Passenger Agent, D. B. Martin; General Ticket Agent, John Egan; Purchasing Agent, Edward Hill. President Ingalls will fill the other offices.

Colorado Midland.—H. Collbran, Traffic Manager, has been appointed Assistant General Manager, with headquarters at Colorado Springs.

Erie & Wyoming Valley.—The annual meeting was held last week and the following officers were elected: President, John B. Smith; Vice-President, A. H. McClintock; Secretary and Treasurer, George B. Smith; Directors, John B. Smith, E. H. Mead, George H. Catlin, John King, Samuel Hines, Andrew H. McClintock, S. M. Felton, Jr.

Kansas City, Wyandotte & Northwestern.—M. D. McCormick, in addition to his duties as Roadmaster, has been appointed Superintendent of Bridges and Buildings, vice W. H. Wolcott, resigned.

Keokuk & Des Moines.—Hugh Riddle and R. R. Cable, of Chicago, and Edward Johnstone, of Keokuk, have been elected Directors for a term of three years.

Kickapoo Valley & Northern.—The incorporators of this Wisconsin company are: W. H. Bennett, of Mineral Point; B. F. Washburn, of Excelsior, Richland County; J. O. Davidson and Ole O. Fahl, of Soldiers' Grove; A. C. V. Elston and W. S. Manning, of Muscoda.

Jefferson.—The following officers were elected last week: President, Samuel Hines; Secretary, A. R. Macdonough; Treasurer, Edward White; Directors, Samuel Hines, C. D. Simpson, W. A. May, J. Lowder Welsh, John King, Samuel M. Felton, Jr., A. R. Macdonough and Edward White. The road is controlled by the New York, Lake Erie & Western.

Lehigh Valley.—H. S. Drinker, General Solicitor, has been appointed Assistant to the President. He also retains his former title.

Little Falls, Van Hornesville & Otsego Lake.—D. O. Tilyou, David Shaul, Louis G. Young, Menzo Kelley, Smith I. Young, John Weteron, A. Tilyou, B. J. Hallenbeck, J. A. Fikes, J. D. Munn, Van Hornesville, N. Y.; Myron G. Bronner, Little Falls, N. Y.; Morse Weldon, Starkville, N. Y., and E. V. Decker, Newville, N. Y., are the directors of this New York company.

Nebraska & Western.—This company, the Nebraska Division of the Pacific Short Line, last week elected the following officers: Millard R. Jones, of New York, President; D. A. McKenzie, of New York, Vice-President; E. H. Stone, of Sioux City, Treasurer; T. W. Tomlinson, of New York, Secretary. These, with John Peirce and C. L. Wright, of Sioux City, and W. D. B. Jones, of New York, constitute the Board of Directors.

New Jersey & New York.—Mr. Henry W. De Forest was recently elected President of the road, to succeed Valentine L. Lary, resigned.

Newport News & Mississippi Valley.—John T. Morris has been appointed Southern Passenger Agent of the Western Division, with headquarters at Memphis, Tenn.

Northern Pacific Terminal Co.—The company this week elected Henry Failing, C. H. Lewis, C. A. Dolph, W. H. Holcomb, Paul Seulze, Charles J. Smith, Robert Harris, R. Koehler and W. H. Corbitt directors.

Oregon Railway Extension Co.—At the meeting in Portland this week the company elected the following directors: Henry Failing, C. A. Dolph and Holcomb W. Corbitt and C. H. Lewis.

Oregon Railway & Navigation Co.—At the annual election in Portland, Ore., June 17, Mr. Villard voted 152,000 shares. The following ticket agreed upon by Mr. Villard and General Dodge, representing the Union Pacific, was elected: Chas. B. Fosdick, V. Mumford Moore, P. W. Smith and William P. St. John, of New York; Henry B. Reed, of Baltimore; Edmund Smith, of Philadelphia, and H. W. Corbitt, Henry Failing, W. S. Ladd, C. H. Lewis, William Mackintosh, John McCracken and W. Sibson. The stock of this company held by the Oregon & Transcontinental is to be disposed of by that company and distributed as widely as possible. The lease to the Oregon Short Line is to stand as it is.

Oregon Short Line & Utah Northern.—The following is the first board of directors of the consolidated company: Charles Francis Adams, Frederick L. Ames, F. Gordon Dexter, Edwin T. Atkins, Sidney Dillon, John Sharp, William H. Holcomb, Oliver W. Mink and George W. Cumming; Messrs. Sharp and Cumming being the Utah directors, Mr. Holcomb at Omaha, Mr. Dillon at New York, and the others at Boston. Mr. Adams is President, Mr. Holcomb, Vice President; Gardiner M. Lane, Second Vice-President; James E. Harris, Treasurer, Oliver W. Mink, Controller; Alexander Millar, Secretary, and Luther S. Anderson, Assistant Treasurer.

Oregon & Transcontinental.—At the annual meeting in Portland, June 17, the following board of directors was

elected, 217,000 shares being voted by Mr. Villard and his friends, Elijah Smith and associates voting 159,000 shares: Henry Villard, E. H. Abbott, Charles L. Colby, Joseph S. Decker, Colgate Hoyt, Charles H. Robes, C. A. Spofford and Hector Tyndale, of New York: T. H. Bartlett, C. H. Bellinger, A. D. Charleton, S. G. Fulton, M. G. Hall, C. H. Prescott, Joseph Simon, Paul Schultze and George H. Williams, of Portland. The directors re-elected the old officers.

Pacific Railway Co. in Nebraska.—The following officers were elected at the annual meeting in Hastings, Neb., June 11: President, Edwin Gould, New York; Vice-President, Church Howe, Auburn, Neb.; Secretary, E. G. Merriam, St. Louis; Treasurer, A. H. Calef, New York; Assistant Secretary, W. P. McCreary, Hastings.

Pennsylvania, Lehigh & Eastern.—This company has been organized at Wilkesbarre, Pa., with Samuel F. Pierson, President, and the following directors: S. F. Pierson, S. P. Wolverton, E. P. Darling, Elias Lowenstein, Pennsylvania: J. W. Fellows, New Hampshire; Silas W. Newberger and J. N. Newberger, New York.

Presumpscot.—Directors of this new Maine road have been elected as follows: George P. Wescott, Edward Moore, James Webb, Jr., William J. Knowlton, C. Eugene Wescott. The directors elected George P. Wescott, President, George F. West, Clerk and Treasurer.

Pueblo, Gunnison & Pacific.—The company has elected the following officers for the ensuing year: President, Charles Henkel; Vice-President, J. B. Orman; Treasurer, George Bell; Chief Engineer and Secretary, H. R. Holbrook; J. N. Carlile, J. D. Miller, Robert Grant, William Crook and F. M. Dunbaugh, with the four officers, constitute the board of directors.

Roanoke & Southern.—Hon. Henry S. Trout, of Roanoke, Va., has been elected President of the Roanoke & Southern road.

Richmond & Danville.—The office of the Division Freight and Passenger Agent of the Virginia Midland Division, which has heretofore been at Alexandria, Va., will be located at Lynchburg, Va., to which address all communications to that office should be sent hereafter.

St. Joseph & Grand Island.—The annual meeting of the stockholders was held at Elwood, Kan., June 11. Directors were elected as follows: Charles F. Adams, Fred L. Ames, Elias Ascel, Elias C. Benedict, James H. Benedict, H. P. Dillon, Sidney Dillon, G. M. Lane, W. H. Holcomb, Francis K. Pendleton, William Strauss, Charles Monroe and A. L. Williams.

St. Joseph, St. Louis & Santa Fe.—The annual meeting of the company was held in St. Joseph, June 11. The following directors were elected: E. Wilder, B. M. Curtis, D. Crosby, P. G. Noel, W. B. Strong, G. C. Magoun, J. J. McCook, Winslow Judson, W. D. B. Motter, I. T. Hosea, E. L. Marney, C. A. Shoup and J. W. Walker. The officers are: Winslow Judson, President; A. A. Robinson, Second Vice-President and Chief Engineer; J. F. Goddard, Third Vice-President and Manager; Edward Wilder, Secretary; L. Gallup, Treasurer; G. R. Peck, General Solicitor; J. P. Whitehead Comptroller; J. W. Rinehart, General Auditor.

St. Joseph Terminal.—The annual meeting was held in St. Joseph, Mo., June 11, and the following directors were elected: Winslow Judson, E. McNeill, W. P. Robinson, Jr., W. D. B. Motter and Isaac T. Hosea. The following officers were elected: Winslow Judson, President; E. McNeill, Vice-President; A. D. Walker, Treasurer; C. F. Smith, Secretary, and J. P. O'Brien, Superintendent.

St. Louis, Quincy, Omaha & Sioux City.—The following officers have been elected for the Iowa division: President, F. B. Stearnes, St. Louis; Vice-President, J. C. Richardson, St. Louis; Treasurer, Theo Weed, New York; Secretary, Josiah Fogg, St. Louis, Assistant Treasurer and General Superintendent, J. F. Peavey, Sioux City; Directors, F. B. Stearnes, J. C. Richardson and Thomas A. Scott, St. Louis; J. C. Bishop, Quincy; James E. Booge and J. F. Peavey, Sioux City, Ia.

St. Paul & Duluth.—The annual election was held in St. Paul, June 17. The present management voted 33,000 shares, while the old management held 23,000 shares. The vote was upon three directors, to serve for a term of three years. The choice was E. W. Peet, J. Smith, Jr., and E. L. Dudley. The only change in the directory is the substitution of Mr. Dudley for W. H. Fisher, the Ex-President and General Manager of the company. The directors elected the old officers. They are: President, R. S. Hayes; Vice-President and General Manager, E. L. Dudley; Secretary and Treasurer, Philip S. Harris; Assistant Secretary and Assistant Treasurer, G. G. Haven, Jr.; Land Commissioner, Hopewell Clarke.

Sioux Falls, Yankton & North Platte.—Organized at Sioux Falls, Dak., by J. M. Spicer, of Willmar, Minn.; E. J. Sherman, R. F. Pettigrew and D. R. Bailey, of Sioux Falls, and J. R. Gamble, G. R. Scougal and L. M. Purdy, of Yankton.

Union Pacific.—At a meeting of the directors in Boston, June 19, L. S. Anderson was chosen Assistant Secretary. Andrew H. Green, of New York, resigned his seat in the Board, to go upon the Board of the new Consolidated Oregon Short Line & Utah Northern Company, representing the minority stockholders in that company. M. A. Hanna, of Cleveland, a member of the recent Board of Government Directors, was chosen to fill the vacancy occasioned by the resignation of Mr. Green.

OLD AND NEW ROADS.

Alabama Midland.—There is now about 100 miles of the main line of this road graded and 32 miles of track has been laid from Bainbridge, Ga., to the Chattahoochie River. The entire line is covered with men and teams, clearing right of way, grading, erecting bridges and tracklaying. Forty of the 51 miles of the Northwest & Florida road has been changed to standard gauge.

Annapolis & Baltimore Short Line.—The connecting line between this road and the Bay Ridge & Annapolis, from Geddings Station to a point about half a mile west of Annapolis has been completed. Joseph M. Brian was the contractor for grading and N. Clow for the trestles. Over College Creek there were 17 bents.

Athens & Jefferson.—R. T. Martin & Co. have been given the contract for building this road from Athens north west to Jefferson, Ga., 18 miles.

Atlantic & Danville.—The main line was open to Lawrenceville, Brunswick County, last week, from the former western terminus, near Belfield, Va. The main line is now 110 miles long from Norfolk. The road is to be extended from Lawrenceville to Danville.

Barnegat Park.—Construction on this short New Jersey road from Barnegat Park to the ocean shore has been suspended for the present, and it is not known when it will be resumed. No track has yet been laid.

Bath & Hammondsport.—This road, which extends from Bath to Hammondsport, N. Y., a distance of nine miles, has just been made standard gauge. It was formerly of 3-ft. gauge.

Big Horn & Southern.—Preliminary surveys have been commenced for this road, which is to extend from Custer City, Mont., at the mouth of the Big Horn, south to a point in Wyoming at or near Buffalo, Johnson County.

Carthage & Adirondack.—The extension north from the former terminus at Oswegatchie, N. Y., 4½ miles to the Little River Magnetic Iron Mine, is now completed.

Chattanooga Union.—Poe & Frye, of Chattanooga, have the contract for building an extension, 2⅞ miles long, from East End to Mountain Junction, Chattanooga.

Chesapeake & Ohio.—The five-mile branch of this road on Paint Creek in West Virginia is being built by J. C. Carpenter, and the eight-mile branch on Cabin Creek in the same state is being built by C. D. Langhorne, of Richmond, Va.

Chesapeake & Ohio Canal.—The stockholders of this company, of which the state of Maryland is the largest, have passed resolutions authorizing the issue of bonds to provide for repairing the canal and putting it in shape for navigation.

Chicago, Hannibal & Springfield.—It is stated that Fudge & Strang, of Kansas City, and J. S. McTighe & Co., of Memphis, have been given the contract for building 400 miles of this road between Peoria, Ill., and Springfield, Mo.

Chicago, Kansas & Nebraska.—At the annual meeting in Topeka, June 12, it was voted to complete the Fort Reno branch of the Southwestern Division at once. This line will run from Pond Creek to Fort Reno via King Fisher, a distance of over 100 miles. The stockholders ratified the contract of April 10, 1889, between the Union Pacific and the Chicago, Rock Island & Pacific, and the Chicago, Kansas & Nebraska, whereby the Union Pacific is given the right to run its trains over part of the railroad of the Chicago, Kansas & Nebraska.

Chicago, Milwaukee & St. Paul.—The company has made to the United States Trust Co., of New York, a mortgage for $150,000,000. This mortgage is for the purpose of taking up all other indebtedness of the road at a lower rate of interest, and to lay additional double tracks and make other improvements necessary. It gives the whole property as security, and is for a larger amount than any mortgage ever before executed.

Chicago, St. Paul & Kansas City.—It is stated that the right of way difficulty between this road and the Kansas City, St. Joseph & Council Bluffs over the occupation of a certain street in St. Joseph, Mo., and the crossing of the tracks of the latter by the former, will soon be settled. The extension from St. Joseph to Leavenworth to connect with the Kansas City, Wyandotte & Northwestern, will then be built. Trains will run into Kansas City, Mo., over the tracks of the Kansas City, Wyandotte & Northwestern.

Concord.—The report of the New Hampshire commissioners appointed to inquire into the state's interest in the Concord and the Boston & Maine roads, as filed in the legislature, is a very voluminous document, and includes many exhaustive tables. In relation to the Concord road it finds that the purchases by that corporation of the outside lines and the expenditure of its earnings are consistent with the demands of travel and the public good. The character and amount of the state's interest is shown in the right to alter rates and profits under certain conditions and to purchase the road with all franchise, rights, etc., at any time by the payment of the amount of the capital stock, $1,500,000, and the deficiency of the dividends, $659,497, a total of $2,159,497; if simple interest is allowed on the deficiency of the dividends, the total would be $3,309,755; if compound interest is computed, $5,728,600. In relation to the state's interest in the Boston & Maine, the Commissioners had no means of determining the results, as the books of the company in New Hampshire have never been kept separate from those of the line in Maine and Massachusetts. The state, under the charter, can take road upon the payment of the capital stock.

Cornwall & Lebanon.—The Mount Gretna narrow gauge railway, a 2-ft. gauge road, from Mount Gretna, Pa., to Governor Dick Mountain, four miles, has just been completed. It will be operated as a division of this line.

Cumberland Valley.—Track laying on the extension from Martinsburg, W. Va., to Winchester, Va., 22 miles, is now completed to Darkesville, W. Va., a distance of seven miles. The entire line will be completed by Sept. 1. Nearly all the grading is now done.

Danville & East Tennessee.—Organized in Danville, Va., June 19, by A. E. Bateman and R. S. Stuart, of New York, and others, to build the proposed western extension of the Atlantic & Danville, now being extended to Danville, which point it is expected to reach before Jan. 1, when trains will be run through from the eastern terminus at Norfolk.

Decatur, Chesapeake & New Orleans.—The entire line in Lincoln County, Tenn., is now under contract, with work in progress. Commencing at the county line, the contractors are: Shirley & Moore, Florence, Ala., five miles; Crebs & Brady, St. Louis, 3½ miles, which includes a rock cut 36 ft. deep; McBean & Murray, New York, four miles; J. E. Porter, Athens, Ga., 2½ miles; Martin & Dickerson, Atlanta, six miles; J. T. Cross, Decatur, Ala., five miles; John M. Anderson, Decatur, five miles. Crebs & Pollock, of Kirksville, Mo., have the contract to furnish the sleepers. The bridge work will be done by Rockwell, Anderson & Co., of Chattanooga, and the bridge masonry by Alliger & Golightly, of Florence, Ala.

Delaware River & Lancaster.—Work was commenced on this road at Pughtown, Chester County, Pa., June 17, under contractor C. A. Rice. The road will be built from Phœnixville to Falls of French Creek.

Denver & Rio Grande.—Tracklaying on the branch from Sapinero, Garrison County, south to Lake City, Hinsdale County, Col., a distance of 36 miles, will be completed July 1, but 11 miles remaining to be laid to bring the line to Lake City. The branch west from Glenwood Springs is now completed to New Castle. Grading is nearly all done from this point to Rifle Creek, 26 miles from Glenwood, and tracklaying will soon begin. It is stated that the Denver & Rio Grande, Denver & Rio Grande Western and the Colorado Midland roads will build a joint track from the end of this branch, along the Grand River, to Grand Junction.

Dexter & Piscataquis.—Over 400 men are at work on this line and tracklaying will begin soon at Dexter, Me. The road will probably be opened to Foxcraft, 16½ miles, by Dec. 1.

East Tennessee, Virginia & Georgia.—It is stated that the right of way difficulty between this road and the Louisville & Nashville through a gap near Blocton, Ala., has been settled, and that a line 15 miles long will be built and operated jointly. This company recently incorporated a line to build from Montevallo to Blocton, and thence to Birmingham, and it is claimed that the new line will be open to Blocton by November next.

Easton & Northern.—The right of way for this Pennsylvania road has been secured from Easton to Ashland, and a construction force will probably soon be put on the line. J. T. Knight, of Easton, is president.

Fort Madison & Northwestern.—At Des Moines, Iowa, Master in Chancery P. T. Lomax has filed his report in the case of the Union Trust Co., of New York, against the road. About $35,000 of claims is allowed prior to the mortgage held by the Union Trust Co.

Georgia, Carolina & Northern.—The company is recording in Georgia a mortgage for $5,000,000 in favor of the Mercantile Trust & Deposit Co., of Baltimore, to secure funds to complete its road, 45 miles of which, from Monroe to Chester, N. C., is now in operation. The road forms part of the Seaboard & Roanoke system.

Georgia Pacific.—The Western extension through the state of Mississippi was completed June 18, the line being connected at Winona. This extension gives the Richmond & Danville connection with the Missouri Pacific system at Arkansas City on the Mississippi River. The tracks of the Louisville, New Orleans & Texas will be used from Greenville northwest to Huntington, opposite Arkansas City, 11 miles. This gives the Richmond & Danville a continuous rail line of 1,110 miles from Washington, D. C., to Greenville, Miss., via Lynchburg and Danville, Va., Charlotte, N. C., Atlanta, Ga., Anniston and Birmingham, Ala., Columbus and West Point, Miss.

Georgia Southern & Florida.—It is expected to have all the grading on the extension to Palatka, Fla., 138 miles from Valdosta, completed early in September. Tracklaying is now in progress at four different points and will be finished by Nov. 1, rails now being down for 162 miles from the northern terminus at Macon. Morgan & Reynolds have the contract for the first 75 miles south of Valdosta, Ga., and Waters & Wright have the contract for grading, cross ties and tracklaying on the rest of the line.

Grand River Coal & Railway Co.—Incorporated in Colorado by Thomas H. Edsall, Edward Wright, M. W. Mather, E. F. Jones and Daniel E. Sweet, of Glenwood Springs, to build lines of road from the Colorado Midland in the counties of Garfield and Pitkin. The capital stock is $10,000.

Grand Trunk.—This company has opened their newly constructed branch line from Peterboro, Ont., to Chemung Lake.

Great Northwest Central.—The hitch in the negotiations, which were being conducted with the Northern Pacific & Manitoba, by which the latter company was to construct the Great Northwest Central, is understood to arise from the fact that the Northern Pacific & Manitoba regards the land grant upon which this company is organized as very indefinite. They hold that the Canadian Pacific has yet 10,000,000 acres of land, the balance of its subsidy, to select, and having a priority of claim, it can select where it chooses. That being the case, it is held, there is nothing to prevent the Canadian Pacific blocking and hampering the Great Northwest Central in its choice of lands. This would be the policy if the Northwest Central fell into the hands of the Northern Pacific & Manitoba. The government at Ottawa are endeavoring to force the Canadian Pacific to immediately select its unallotted lands.

Hartsville.—Tracklaying is now in progress on this road, which is being built from a point above Darlington, S. C., west about 10 miles, to Hartsville. The line will be completed about Sept. 1.

Hiawassee Iron, Mineral & Railroad Co.—Organized at Dayton, Tenn., by G. W. Saulpaugh, John G. Carter and W. T. Hayes. It is proposed to build a railroad from Dayton to Hiawassee Gap via Calhoun, 32 miles, with a branch to King's Point. It is intended to connect the Cincinnati Southern and Knoxville Southern roads.

Jacksonville, Tampa & Key West.—Track laying on the Jupiter & Lake Worth road was completed last week from Jupiter south to Lake Worth, a distance of eight miles.

Kickapoo Valley & Northern.—Articles of incorporation filed in Wisconsin to build a road from a point on the Wisconsin River, near the village of Woodman, Grant County, north to Norwalk, in Monroe County, a distance of about 80 miles. The capital stock is $1,000,000. The survey is now in progress.

Leavenworth, Denver & California.—Charter filed in Kansas by this company, a reorganization of the Leavenworth & Denver Short Line and the Colorado & California Short Line. These companies created great excitement in Kansas about a year ago, on account of their mysterious surveys through the state, and the repeated predictions of their projectors that they would immediately commence building a line from Leavenworth to Denver.

Little Falls, Van Hornesville & Otsego Lake.—Incorporated in New York for the purpose of constructing a narrow-gauge railroad commencing at Little Falls, Herkimer County, N. Y., and terminating at the Otsego Lake in the town of Springfield, Otsego County, a distance of 17¼ miles. The capital stock is $160,000.

Long Island.—The extension from Locust Valley to Oyster Bay, four miles, will be opened for traffic June 24. Trains on the Glen Cove division will then run through to Oyster Bay.

Louisville, Evansville & St. Louis Consolidated.—The company has filed resolutions in Illinois authorizing the issue $1,300,000 in preferred stock, $3,790,747 common stock and $8,000,000 first consolidated mortgage 50 year 5 per cent. gold coupon bonds, with interest payable semi-annually, secured by mortgage or deed of trust in favor of the New York Security Trust Co., and Joseph Collect, as trustees, upon the property, franchises and equipment of the company.

Macon & Birmingham.—The Macon Construction Co., of Macon, Ga., will let the contract on July 15 for building 100 miles of this road, between Macon and Birmingham, Ala. The surveyors are now between the Coosa and Tallapoosa rivers. W. Henry Wells, of Macon, is Chief Engineer.

Mary Lee Coal & Railway Co.—The railroad to be built by this company is to be completed in August. The road is to extend from East Birmingham to Lewisburg, four miles, and three miles of branch road to other coal openings owned by the company.

Mexican National Construction Co.—The Manzanillo division has been completed into the City of Colima, Mex., about 60 miles from the port of Manzanillo, on the Pacific. The line south runs along the coast to near Armeria, and northeast from that point, 32 miles to Colima.

Mobile, Jackson & Kansas City.—The locating survey from Mobile northwest to Jackson, Miss., has just been finished. Estimates and profiles are now being made, and as soon as these have been completed contracts will be let. T. W. Nicol, of Mobile, is Chief Engineer.

Montpelier & Wells River.—The Barre extension of the road was opened to the public June 17. Three passenger trains each way daily will run over the new line.

Newfoundland.—Not satisfied with the tenders they received for the construction of this road, some 250 miles in length, the government of Newfoundland has decided to carry it on as a government work. Mr. H. Burchell, Chief Government Engineer of Public Works for the colony, is selecting his staff of engineers, and will visit the United States for the purpose of purchasing plant. Work will be commenced immediately upon his return.

New York & Connecticut Air Line.—The Connecticut House of Representatives has refused to extend the time for the construction of the road. The vote was 35 to 94.

New York, New Haven & Hartford.—The Governor of Connecticut has signed the bill which recently passed both branches of the Connecticut Legislature by large majorities, giving the company power to increase its capital stock from $35,000,000 to $50,000,000. The new stock is to be offered at par to present stockholders, and any not so taken will be listed at the New York Stock Exchange.

Norfolk & Lake Drummond.—Meetings are being held in Norfolk County, Va., in favor of a project to build a road from Norfolk, southwesterly to Lake Drummond, near the state line, a distance of about 20 miles.

Norfolk & Western.—Mason, Hoge, Gooch & Co., of Frankfort, Ky., have closed a contract for building the extension of the Clinch River branch to Big Stone Gap, 30 miles. It is to be completed by Nov. 1.

Northern Pacific & Manitoba.—In addition to the 50 miles of the branch from Morris to Brandon, 45 additional miles have been placed under contract. The following are the contractors: Egan Bros., 5 miles; McAnnary & Erwin, 5 miles; McCrimmon, 3 miles; Sinclair & Flannigan, 5 miles; C. Macdonald, 2 miles, and Strevel, 15 miles. There is now 45 miles of grading done on the branch. The company will do the tracklaying itself, and will begin in a few days.

The company has deposited with the Secretary of State at Ottawa, Ont., a mortgage made May 1, 1889, between the company and the Farmers' Loan & Trust Co., of New York, for securing payment of an issue of bonds not exceeding $20,000 per mile of the main and branch lines.

Oregon Short Line & Utah Northern.—This name has been adopted for the consolidation of the various roads controlled by the Union Pacific in Utah and west of there, viz: Oregon Short Line, Utah & Northern, Utah Central, Salt Lake & Western, Utah & Nevada, Oregon & Syracuse, Idaho Central and Nevada Pacific, which, as we have already announced, are to be merged into one company instead of each having a separate board of directors as heretofore. The consolidation is for 50 years. The capital stock will be $24,789,039, divided into $100 shares, to be issued in exchange for the stock of the eight constituent companies on this basis: Oregon Short Line, share for share; Utah & Northern, five shares for four; Utah Central, two shares for three; Salt Lake & Western, two shares for three; Utah & Nevada, one $1,000 bond and one share of stock for ten shares; Idaho Central, two shares for three, and Nevada Pacific, one share for four. Stockholders not wishing to exchange on this basis may sell their stock to the new company at a valuation to be appraised by two appraisers, one appointed by the company and one by the stockholders, these to appoint a third if necessary, a majority decision to be final. The several companies now have about 1,430 miles of road in operation, and when the projected extensions and branches are finished, there will be a mileage of 2,224 miles. The Oregon Short Line and Utah & Northern control 1,026 miles of this road. The company is to have power to increase its stock and to issue bonds. The right is reserved to issue bonds under terms of the Oregon Short Line mortgage of Nov. 1, 1881, and under existing mortgages of the Utah & Northern.

Oregon & Transcontinental.—At the annual meeting in Portland, June 17, a resolution was adopted to the effect that the company would hereafter receive its own stock in payment of any and all obligations due the company and cancel it. At the special meeting of the stockholders, called to ratify the proposed issue of preferred stock, the proposition to issue it was withdrawn for reasons that have already been given.

Ottawa & Vandreuil.—Work is expected to commence upon this road next week. It is understood that the government has promised to increase the subsidy of $3,200 per mile voted last session of Parliament.

Owensboro, Falls of Rough & Green River.—Tracklaying is in progress on this road, and it will soon be completed between Owensboro in Daviess County, Ky., and Fordsville, Ohio County. Some of the rolling stock has arrived. The Central Construction Co., of Henderson, Ky., has the contract for building the road between Owensboro and Fordsville.

Pennsylvania, Lehigh & Eastern.—Organized at Williamsport, Pa., as a reorganization of the Lehigh & Eastern, which was purchased under foreclosure of a first mortgage on all the franchise and rights of the line which was incorporated by special act of the State Legislature. This charter gives the company the right to construct a railroad from Tombicken, Luzerne County, the eastern terminus of a branch of the Pennsylvania system making direct communication with that company's main line to Pittsburgh and the West. The route, as surveyed, will be in close proximity to nearly 50 collieries, and through the anthracite coal regions in Luzerne, Carbon, Monroe and Pike Counties to Port Jervis, N. Y., where it will make direct connection with roads constructed via Campbell's Hall to the Poughkeepsie Bridge.

Philadelphia & Reading.—The survey has just been completed for the proposed branch from Lofty to Shifton, Pa., which is intended to reach new coal colleries. It is stated that construction work will commence this month.

Poughkeepsie & Boston.—The last rail on this road was laid Friday, June 14, in Poughkeepsie, N. Y. The line extends from Silvernails Bridge, N. Y., where it connects with the Hartford & Connecticut Western, southwest to the Poughkeepsie Bridge, 27 miles. At Poughkeepsie it connects with the Hudson Connecting road, which has been completed from the Poughkeepsie Bridge west to Campbell Hall, N. Y., 29 miles. This gives a completed line from Campbell Hall, where connection is made with the trunk lines across the Poughkeepsie Bridge to Hartford Conn. The Springfield & Connecticut will build from Simsbury, 15 miles west of Hartford, north to Springfield, Mass., 19 miles. These four railroad companies and the Poughkeepsie Bridge Co. are to form the Central New England & Western road.

Raritan River.—A. B. Nelson, New Brunswick, N. J., is the contractor on the section between Washington and New Brunswick, N. J., six miles.

St. Augustine & South Beach.—The extension from South Beach Junction to South Beach, Fla., 2½ miles, is now all graded. The rails have been received and will soon be put down and the branch opened for traffic in the fall.

St. Cloud Sugar Belt.—The extension of the road from the former terminus at Runnymede, Fla., to Narcoosee, 3½ miles, has been completed. W. S. Douglass, of Kissimmee, Fla., had the contract.

St. Louis, Arkansas & Texas.—A committee of bondholders has been formed to protect the bondholders' interests, and to formulate a plan for reorganizing the road and placing the property on a paying basis. The committee consists of F. C. Olcott, President of the Central Trust Co., Chairman; Henry Budge, of Hallgarten & Co.; Edwin Smith and representatives of the firms of J. Kennedy Tod & Co. and Speyer & Co. Mr. Olcott will represent the Central Trust Co., the trustee under the first mortgage, on which the interest due May 1 is in arrears, the payment of the coupons by the Mercantile Trust Co. having been stopped a short time ago, on the ground that the coupons were not being cancelled as they were paid. Speyer & Co. will represent the German bondholders. An examination will soon be made of the property and the requirements necessary to place it on a paying basis.

Savannah, Americus & Montgomery.—The line between Americus and Abbeville, Ga., 62 miles, has been changed to standard gauge, and 60-lb. rails laid in place of the 30-lb. An additional 20 miles of the Savannah extention has been put under contract, from McRae, Ga., east to the Oconee River. Redmond & Radcliffe and McLaughlin Bros. are the contractors for the earthwork.

Sioux Falls, Yankton & North Platte.—This company was organized in Sioux Falls, Dak., June 11. The object is to build a line from Sioux Falls to Yankton, and there make connections with the Yankton, Norfolk & Southwestern. At Norfolk, Neb., this latter line will connect with the Union Pacific and other lines. It is thought that the new road is in the interest of the St. Paul, Minneapolis & Manitoba.

Somerset.—S. C. Mills & Son, of South Norridgewock, Me., have been awarded the contract for grading the extension from Carritunk Falls to Bingham, Me., on the east side of the Kennebec River, seven miles. This firm also built the extension from North Anson to Carritunk Falls. The bonds recently placed are at the rate of $5,500 per mile.

South Atlantic & Ohio.—Mason, Hoge & Co., of Frankfort, Ky., are the contractors on the 27-mile extension of this road, now under construction from the present terminus 43 miles west of Bristol, Tenn., toward Big Stone Gap in the Cumberland Mountains and the coal fields of Wise County, Va.

Tabor & Northern.—The location is being made for the line between Tabor and Malvern, Ia., nine miles. Right of way is also being secured, and when this has been done it is expected to let contracts. A. T. West, of Tabor, Ia., is Secretary.

Tiffin & Fremont.—The company has just filed a mortgage in Ohio for $1,500,000 made to the International Trust Co., of Boston, Mass., to secure funds for building the road from Marblehead to Upper Sandusky, O., a distance of 65 miles.

Union Pacific.—The company has opened its Gunnison line for business between Romley and Pitkin, Col., 19 miles. The section has been closed during the winter, owing to the snow and ice at the Alpine tunnel.

Union Point & White Plains.—Tracklaying was commenced July 15. The line is to extend from Union Point southwest to White Plains, Ga., 13 miles, and is to be operated by the Georgia road, with which it connects at Union Point.

Valley (Ohio).—It is stated that the company has finally closed the sale of a controlling interest of the road to Taintor & Holt, New York brokers, representing a New York syndicate. The road's facilities will be increased, and the line extended toward Pittsburg.

Wabash.—The Wabash case in the United States Circuit Court, at Toledo, Ohio, before Judges Jackson and Gresham, closed June 18. Judge Jackson reserved his decision on the question of the disposition of funds from the sale of the road's equipment. In the second case, involving the allowance of counsel fees, the decision is also reserved, giving leave to the claimant to file a petition in place of the affidavit, to be answered in two weeks. In the question involving the payment of the difference of interest between the old 7 per cent. bonds and the new 5 per cent. ones from the present time to the date of their maturity, the motion was disallowed. In this matter a notice of appeal was given.

West Virginia Central & Pittsburgh.—It is expected to complete the extension to Elkins, W. Va., about 25 miles southwest of Parsons, by July 10. Track is laid on 17 miles of this extension to New Interest, W. Va. The work is being done by the company, no contractors being employed.

TRAFFIC.

Traffic Notes.

The Missouri Railroad Commissioners have summoned the principal roads of the state to appear June 25 to show cause why rates generally should not be reduced.

The East Tennessee, Virginia & Georgia and the Richmond & Danville have put on fruit trains from Atlanta to the North, by which fruit and melons will make passenger time through to New York.

The Baltimore & Ohio has resumed the sale of one-way party tickets for 10 or more persons at the rate of 2 cents a mile. It is reported that this action is in response to an urgent demand of an association of theatrical managers. The Central Traffic Association has protested against the introduction of this rate by the Baltimore & Ohio.

The Union Pacific seems to have carried its point on the question of switching charges at Denver. It appears that the road had made contracts with certain large Smelters to do their switching for nothing, in consideration of receiving all the tullion traffic from them going to the Missouri River. In establishing a rate for the switching the road alleges as a reason that the contract is in violation of the Inter-state Commerce law.

The demoralization of freight rates has extended as far West as Marshalltown, Ia., and south to the northern boundary of Missouri. The Chicago, St. Paul & Kansas City was the first to apply the 28-cent first-class rate to Marshalltown, but the Rock Island quickly followed with reductions to Ottumwa and Oskaloosa. This compelled the Burlington to reduce its rates, and the result was that the rates all over the eastern half of Iowa dropped on Tuesday to the war basis of 28 cents first-class. The reduction is only on business originating east of Chicago. Lumber rates from Chicago to Omaha and Council Bluffs will be made 13 cents to correspond with the reduction to Kansas City.

The Lehigh Valley contracted in Chicago last week for the transportation of one million bushels of corn from Chicago to New York, by lake to Buffalo and rail the rest of the way, at 6½ cents a bushel, which is just the rate that has been in force by lake and the Erie Canal since the opening of navigation. Much of the grain was already in transit on irregular boats, and the reduction is supposed to have involved a decided cut in the rail rates from Buffalo eastward. There is nothing said about the required three days' notice to the Commission having been given of this reduction. The Canal Forwarders' Association, an organization in the interest of the boatmen on the Erie Canal, at once announced in Chicago a reduction of ¼ cent a bushel on wheat and ⅛ cent on oats.

Chairman John N. Abbott, of the Western States Passenger Association, issued last week five decisions on infringements of the rules of the association, in which six roads are fined for various offenses. The St. Louis, Keokuk & Northwestern is found guilty of making an advertising contract with a publication issued by a base-ball club, by which the rate of fare paid by the club was virtually reduced and competitive business thereby affected. The fine is $100. The Hannibal & St. Joseph and the Kansas City, St. Joseph & Council Bluffs are each fined the same amount for a similar offense. The Chicago & Northwestern was fined $100 for sending a messenger with a ticket to the Palmer House in violation of the agreement to discontinue the sale of tickets in all hotel offices in Chicago. The Chicago, Milwaukee & St. Paul is fined $100 for allowing its agent to sell a ticket to a runner who came to the office from the Grand Pacific Hotel. The rule required the ticket to be punched and signed at the office, but this service was in fact done at the hotel. The ticket agent was reckless that day, and the same day left the service of the company, but the Chairman holds the road responsible for this looseness. The Chicago & Alton is fined $100 for complying with the request of the Union Pacific that tickets be put on sale over that road for Oregon and Puget Sound points, whereas the General Passenger Agents had resolved that the request be not complied with until further consultation.

Alton and St. Paul.

The Chicago, Milwaukee & St. Paul, as noted last week, announced that it would comply with the decision of the Executive board of the Inter-state Commerce Railway Association and endeavor to turn over a portion of the live stock out of Kansas City to the other roads, although it intimated that it felt amply able to secure a large share of that traffic in the open market. It was only two days, however, before the Chicago & Alton announced that it would withdraw from the association, on the ground that the St. Paul had given secret inducements, making it to the interest of shippers to patronize that road. In a letter to Chairman Walker, Vice-President McMullin characterized the competition which the Alton had submitted to for several months as unjust and unlawful. President Miller, of the Chicago, Milwaukee & St. Paul, notified Chairman Walker that his road had not violated the Inter-state Commerce law, and called attention to the fact that under the agreement the chairman has full power to examine the books and records of any company, and to question its officers and agents under oath to determine whether the agreement has been violated. He stated that in the first five months of this year the St. Paul had carried only 2,491 cars of live stock, against 2,224 by the Alton, out of a total of 9,195. The Chicago & Alton rejoins with the statement that these figures include all live stock, while its contention is concerning cattle only, on which the correct totals for five months are: Chicago & Alton, 1,215, and Chicago, Milwaukee & St. Paul, 2,159 cars.

Chairman Walker has called a special meeting of the presidents of the lines in the Inter-state Railway Association for next Tuesday to consider the action of the Chicago & Alton in giving thirty days' notice of withdrawal from that organization.

The notice of reduction in lumber rates from Chicago to Missouri River points which the Chicago & Alton announced to the association over a week ago was officially sent to the Inter-state Commerce commission on June 17. An informal agreement has been arrived at with the Southern roads and the rate named is 13 cents per 100 lbs.

East-bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending June 15 amounted to 39,156 tons, against 45,191 tons during the preceding week, a decrease of 6,035 tons, and against 31,496 tons during the corresponding week of 1888, an increase of 7,660 tons. This includes flour, grain, seeds, provisions, dressed beef, hides, wool and lumber. The following table gives the details:

	W'k to June 15.		W'k to June 8.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	4,849	12.4	4,796	10.6
Wabash	4,670	11.9	4,702	10.4
Lake Shore & Michigan South.	7,044	18.0	7,755	17.1
Pitts., Ft. Wayne & Chicago	3,846	9.8	4,290	9.5
Chicago, St. Louis & Pitts.	2,610	6.7	5,333	11.8
Baltimore & Ohio	3,505	9.0	3,098	6.9
Chicago & Grand Trunk	6,069	15.5	6,348	14.1
New York, Chic. & St. Louis	2,624	6.7	3,541	7.8
Chicago & Atlantic	3,945	10.0	5,328	11.8
Total	39,156	100.0	45,191	100.0

Of the above shipments 2,044 tons were flour, 9,161 tons grain, 1,617 tons millstuff, 5,881 tons cured meats, 1,465 tons lard, 8,715 tons dressed beef, 162 tons grass seed, 2,506 tons butter, 714 tons hides, 705 tons wool, and 4,058 tons lumber.

The three Vanderbilt lines together carried 37.1 per cent. of all the shipments, while the two Pennsylvania lines carried 16.5 per cent.